RAILROAD GAZETTE

FRIDAY, JAN. 2.

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Contributions.

Caution Position of Distant Signals.

Baltimore & Ohio Railroad,
BALTIMORE, December 24, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I would like to see some argument in your valuable paper as to the proper caution position of distant signals. Should a distant signal in the horizontal position be considered a caution signal, seeing that the home signal is in the same position for danger?

I have suggested to change the normal position (horizontal) of distant signals from a right angle to 45 degrees, making the clear positions for both home and distant signals 10 degrees from the vertical line.

We here have two distinct positions for caution and stop by day on home and distant signals, as well as distinction in lights at night. My opinion is (although it may be far fetched) that even caution signals should not be passed in the horizontal position.

F. P. PATENALL,
Supt. of Signals

The Designers of the Washington Bridge.

No. 1 BROADWAY, NEW YORK, Dec. 30, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In an article published in the *Engineering News* of 27th instant, on the Washington Bridge, the writer, following Mr. Hutton's book, speaks of the design No. 13 as the "contract drawing;" and, while giving full credit to all other persons who submitted designs, does not mention the names of the designers of that plan, which has been executed with very little change.

After rejecting all other plans, the Commissioners requested the undersigned to prepare for them plans and specifications upon which contracts might be made. We did so, and were paid as engineers for so doing. Those plans and specifications, as indicated by design No. 13, were adopted by the Commissioners, and the contracts let according to them. Subsequently, the plan of masonry was modified, as shown in design No. 14, and the price raised correspondingly.

CHARLES MACDONALD,
THOMAS C. CLARKE.

Signaling a Double Track at a Crossover.

KIEW, Russia, Nov. 30, / Dec. 12, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Nov. 14, Mr. X. Y. Z. wishes to know the opinion of interested parties on two different methods of signaling a double track railroad for direct movements and reverse movements at a crossover. On the Russian Southwestern Railroads (length = 2,600 kilom.) we place the dwarf signals for reverse movements between the tracks, and the rule is maintained that always, when possible, a signal should be at the right-hand side of track for trains moving in the direction intended to be governed by said signals.

I suppose in signal matters firmly settled principles to be of the greatest importance. Once settled, that the signal to be observed by the locomotive engineer is always on the right-hand side of track in the moving direction of the train, the engineers become so accustomed to that rule, that they look out mechanically for signal at their left side when moving in backward motion.

A. ABRAMSON,
Manager Technical Department Main Line Service, Russian South Western Railroads.

English and American Freight Cars.

GAINES, WORCESTER, Dec. 14, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Among the notes in your Scrap Heap of Dec. 5 last there is a paragraph on the subject of English Freight Cars and on a paper read by Mr. R. Jefferds, C. E., before the Institution of Mechanical Engineers in London.

Mr. Jefferds endeavored therein to show that very large economies could be effected in English freight traffic by substituting the American type of 8-wheeled bogie car for the European type of 4-wheel car, especially by adopting the tube-frame mode of construction. Some of the statements of the paper were so very extraordinary that, not being backed by the evidence of experiment, the meeting was disposed to doubt. The disussion on the paper (in which I took part) extended over two evenings, and the consensus of opinion was entirely in the direction that in a country so cramped as the British Islands, and consequently the runs so short, the 4-wheel type was more advantageous; also that it was quite as easy to construct 4-wheel cars to carry 15 tons on four wheels as to construct 8-wheel bogie cars to carry 30 tons on eight wheels, with the same proportion of dead to paying load in both cases.

That the dead weight of English 4-wheel cars is excessive to the proportion of the paying load there can be no reasonable doubt; but the means of obviating that lies in the direction of exercising the same skill in designing the 4-wheeler to carry 15 tons as has been exercised by the American designers in designing the 8-wheeler to carry 30 tons. Well acquainted, as I am, with the types of American and European cars, I am by no means convinced that the bogie car, on good roads, possesses any advantage whatever over the 4-wheeler. In fact, I rather lean to the opinion that it would be found disadvantageous in many respects.

W. A. ADAMS, *Member I. M. E.* and *I. C. E.*

Amateurs and Passenger Fares.

NEW YORK, Dec. 27, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am surprised at "Reader's" wonder (*Railroad Gazette*, Dec. 26) that so many clergymen, editors of illustrated monthlies and what not seem inclined to pose as authorities, lecturers and writers on railroad problems. Such posing, lecturing, etc., pays. And, as a general principle, when such a person writes on some subject with which "Reader" is not conversant, he will call the attention of his friends to the wonderful knowledge and to the soundness of the views set forth in the pages of the last number of the *Century*. The fact is that the best and most instructive articles are often written by those "hunger candidates" who bone their facts from the columns of the *Railroad Gazette* or an encyclopædia for the particular pot boiler in hand. And the practice is not without its advantages. As the best mathematicians are notoriously the poorest teachers, so a person who thoroughly understands the subject often finds it difficult to present its governing facts to those who have had no previous knowledge of that subject; whereas a person with more imperfect and rudimentary knowledge would easily and readily convey many new ideas to his hearers. Your esteemed predecessor, Mr. Editor, once pointed out to the writer the great advantages possessed by a lecturer who did not know so much more than his audience.

For example, your correspondent, "Reader," who evidently knows all about railroad fares and railroad accommodations, both "in England and America," says: "The English four cents per mile first class includes drawing-room accommodations," while to a more ignorant man, whose experience, in England, is confined to a trip from Liverpool to London and return, it would appear that the four cents per mile first class included almost anything excepting room, unless it is accommodations.

LEARNER.

The Vertical Plane and the Link-and-Pin.

CHICAGO, Dec. 20, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the subject of car couplers in one form or another seems to be again under discussion at the different railroad clubs, I shall be glad if you will allow me to suggest one or two points and try to correct as many errors.

The Burlington tests appeared to prove two things, both highly important, and if sustained would be worth all the additional cost of these high-priced appliances. Those two problems were: First—That a close coupling was absolutely necessary with the use of the air brake. Second—That a locomotive could start as many cars with a close coupling as with ordinary link slack.

The first conclusion would have been correct if the air was communicated to the first and then to each succeeding car on the train, as was the case at Burlington. The facts are, however, that all the brakes are now set simultaneously; and as more cars are to-day equipped with air brakes and link couplers, which work fully as well as those equipped with the M. C. B. coupler, the first problem is solved and may be dispensed with.

The second problem, that a locomotive could start as many cars with M. C. B. couplers, was also apparently solved at that test; what was not settled, however, was whether a locomotive could start as many cars on a curve or continue to keep them moving on curvatures, and this is much more important to economic railroad operation than the mere starting a train on a straight track. The matter of first cost of the M. C. B. coupler would be serious enough if it accomplished what is claimed for it, but failing to do that managers will soon I am inclined to think, try and save a needless expense.

Great stress has been laid on the word automatic, and the believers in and the promotors of the M. C. B. couplers often talk as if the word itself had been *patented*. The truth is that there are a number of link-and-pin couplers which are more automatic than the above mentioned type, and which will couple with more certainty on a straight track and on curves where the heads of the M. C. B. coupler will hardly come in contact.

I do not wish to make this communication too long, but will say that a closer coupling can be made, and have any play between the cars, with a link than with the hook, and yet avoid the enormously increased friction caused by the use of the hook coupler. It is of course unpleasant for the members of the M. C. B. Association to stultify their act in adopting the type, though the Burlington tests were so misleading that their error was a most natural one; while if they continue, after their eyes are opened, to recommend a needless expense, they will be most certainly open to criticism, to use a very mild term.

A CAREFUL OBSERVER.

Tests of Rail Joints.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have long been much surprised at the claims made for the different rail joints. Nearly every joint maker claims to have a joint which will connect two rails together in such a way as to make the joint as strong as, and no stronger than, the rail itself, and as flexible as, and no more flexible than, the body of the rail. Now this seems to me to be such an utter impossibility that I am ready to wager that there is not a joint in the market which, if tested in the manner given below, will prove to be either as strong as the rail or to have the same flexibility. The claims made for recent rail joints would, if true, give them a character and a perfection which should not be demanded by any intelligent engineer, and as these claims cannot be substantiated, the result is to throw discredit upon the devices.

Now I do not take it that any one is demanding a joint that is just as strong as the body of the rail and no stronger, and as flexible as the body of the rail and no more flexible, principally for the reason that it is impracticable to obtain such an ideal condition and, further, because such perfection is unnecessary. There is much talk about a continuity and uniformity of wave motion and track depression in front of a train, or, perhaps more exactly speaking, in front of the wheels of passenger cars; that, it seems to me, is principally nonsense. The whole depression of a track exactly under the wheels of cars while the cars are passing is small indeed, and yet it may be considerable just ahead of the wheels. What I mean to say is that the rise and fall of the wheels due to the mere deflection of the rails and to the depression of a well-kept roadbed is small, and that upon the uniform flexibility of the rails does not depend the easy riding of the cars and the comfort to passengers, or the safety of the track. It does, however, largely depend upon the freedom of the track from short depressions and weak places. It would seem that if a rail joint was of such a character that it made the joints much stiffer than the rail itself, and yet was not so heavy as to have too much inertia, the track would be a smooth one, even though the flexibility of the rail was not equal at all points.

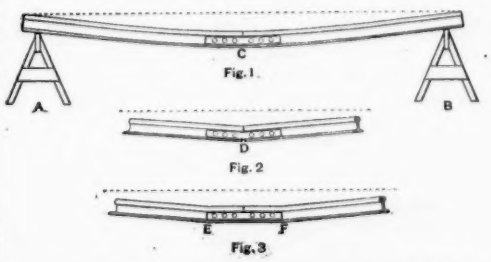


Fig. 1. Fig. 2. Fig. 3.

To show the fallacy of the claims made for rail joints, I would propose the following tests: Let two or three rails be coupled together with a joint to be tested and supported, as shown by the accompanying sketch, on supports at *A* and *B*, fig. 1. If, as claimed, the joints be as flexible as the rail and no more flexible, then the rails will form a true curve, not an arc of a circle, however. If the joint is stiffer than the rail, there will be a flat spot in the curve at the joint at *C*, fig 1. If it is less stiff than the rail, there will be an angle at the joint and the curve will be broken as at *D*, fig. 2. If, now, the ends of the rail be forced toward each other and the camber of the curve increased, the joints will be strained, and if this bending be carried on until a permanent set is given to the coupled rails, the permanent set will be uniformly decreasing from the joint toward the ends, and the curve of flexure will be a true one still, if the joints are equally strong with the rail. But if the joint be weaker than the rail, then there will be a decided kink formed where the rails come together, as at *D*, fig. 2.

I feel sure that this method of testing would throw

some new light upon the comparative values of the different rail joints, and would result in dividing them into several distinct classes, and thus would materially assist in a discussion of their relative merits. It seems to me that the ideal joint is one which is stiffer and stronger than the rail itself, and one which, under the foregoing test, would make the curve flat at the joints and would cause the permanent set to take place at either side of the joint rather than in the joint itself, as shown at *E* and *F*, fig. 3.

ENGINEER.

The Fatal Link and Pin.

BY AN ENGINEER OF TESTS.

Whenever two cars are brought together, as in switching and coupling, the tendency of the blow is to force the outer end of the couplers lower than the tail bolt end, because the coupler is hung below the centre line of the sills, and because the outer end is originally lower on account of the camber of the car body. Hence, it is not long before there is a decided drop to the business end of the coupler. When once this drop is developed, every buffing blow but exagerates it. Consequently, in M. C. B. coupiers it is the upper lugs of the knuckles which must bear the brunt of such shocks, the lower lugs seldom being of much assistance in distributing the strain.

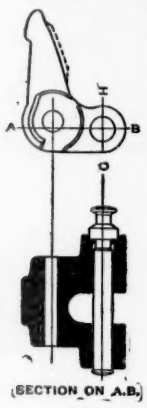


Fig. 6.

When a train is started, or jerked, if you please, from a standstill, the strain is first taken up by the lower lugs of the knuckle, again because of the drop. The strain, however, quickly brings the drawbar to a horizontal position, and the shock and pull are then about equally distributed between the lower and upper lugs. When an M. C. B. coupler is coupled to one with a link and pin the strain on the knuckles is farther from the base of the lugs than when two M. C. B. drawbars are coupled. Hence the probability of breakage is greater in the former than in the latter case. As in most M. C. B. knuckles, the cross-section of the lower lug, where it joins the body of the knuckle, is considerably less than that of the upper lug. Under a jerking or starting strain the lower lug would break before the upper in case an M. C. B. drawbar is coupled with a link and pin. If two M. C. B. drawbars are coupled it is difficult to see how either lug of a sound knuckle could be broken by a pulling strain. Probably the tail of the knuckle would break. The results of laboratory tests strongly indicate this.

As shown in the issue of June 26, 1890, of the *Railroad Gazette*, M. C. B. knuckles which are chipped on either or both lugs on their outer face are broken by weak, short or bent coupling pins. Hence, when coupled to link and pin drawheads the usefulness of knuckle 4 of the accompanying cuts was evidently destroyed by being compelled to travel in such bad company. Knuckle 2 is also a "terrible" example of the evil effects of bad company. It was evidently demoralized by a jerking strain, due probably to the slack commonly occurring with link and pin couplings, and while coupled to a link and pin drawbar. So that the link and pin species of coupler is doubly responsible for the ruin of knuckle 2 and the loss of all knuckles broken similarly.

The fracture of knuckle 1 was undoubtedly occasioned by a buffing blow, and it seems reasonable to assume that all fractures of upper lugs of knuckles which occur outside the coupling pin hole are made in this way. Whether the blow was delivered by an M. C. B. or a link and pin drawbar does not relieve the latter from the responsibility for the fracture, inasmuch as the knuckle is weakened by the opening which must be left for the link. Weakened as it was by this opening, knuckle 1 was almost strong enough to withstand the blow which cracked it, as shown by the fact that the lug was not broken entirely off. If it were not necessary to leave the opening for the link, there is little doubt but that nine-tenths of the fractures of knuckles at present occasioned by buffing blows would be avoided.

It is probable that in many cases where now both lugs of a knuckle have been broken off, there would have been no fracture if the knuckle could have presented a solid front to the strain. But we will assume that in such cases even a solid knuckle would have broken.

If the reasoning so far is correct, it follows that the breakage of the *upper lug* of the M. C. B. knuckle can, in most cases, be traced to a buffing blow and to the link and pin drawhead, because of the necessity of weakening the knuckle by the opening for the link. The breaking of the *lower lug* can likewise be attributed to the link and pin and a jerk. The *cracking* and *chipping* of both or either of the knuckle lugs, or their fracture through the coupling pin hole, on the line *G H*, fig. 6, can be charged directly to the link and pin drawbar without any apology.

Bearing these facts in mind, let us analyze the accompanying table, reprinted from the *Railroad Gazette* of Nov. 7, 1890, as taken from the records of the McConway & Torley Company, and see what proportion of the M. C. B. coupler knuckles now broken would be saved if the link and pin drawhead were abandoned.

Janney knuckles broken from a total of 124,441 *in service* 12.27 *months to Oct.* 11, 1890.

How broken.	Number broken.	Number broken for one in service.
Upper lug off	1,939	.01558
" " cracked	576	.00463
" " chipped	1,198	.00962
Lower lug off	406	.00326
" " cracked	128	.00103
" " chipped	144	.00116
Both lugs off	592	.00400
" " cracked	40	.00932
" " chipped	412	.00331
Upper lug off, lower cracked	56	.00045
Lower " " upper "	25	.00021
Upper lug off, lower chipped	218	.00175
Lower " " upper "	230	.00185
Tail off	87	.00069
Worn out	57	.00046
No defect observed	11	.00009
Miscellaneous	27	.00021
	6,056	.04866

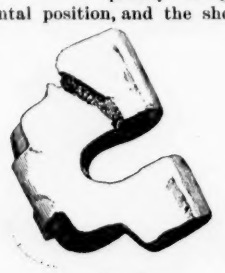


Fig. 1.

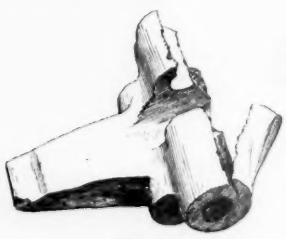


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

BROKEN M. C. B. KNUCKLES—FROM PHOTOGRAPHS.

Upper lug off. *Upper lug cracked.* *Upper lug chipped.* *Both lugs off.* *Both lugs cracked.* *Both lugs chipped.* *Tail off.* *Face split.*

Diagrams for Record of Broken Knuckles.

Knuckles broken directly by link and pin.

Upper lug cracked	576
" " chipped	1,198
Lower " cracked	128
" " chipped	144
Both " cracked	40
" " chipped	412
Total	2,498

In short, 41.25 per cent. of the broken M. C. B. knuckles are broken by the link and pin directly.

To the above table should be added those with "upper lug off," "lower lug off" and both lugs off," which are broken through the coupling pin hole on the line *G H*, fig. 6. It is also probable that wherever one lug is off and the other cracked or chipped the breakage should properly be credited to the link and pin directly; but as they are all included in the following table it will not affect the outcome.

Knuckles which would not have been broken if not weakened by the opening for link.

Upper lug off	1,939
Lower " "	406
Upper " " lower cracked	56
Lower " " upper "	25
Upper " " lower chipped	218
Lower " " upper "	230
Total	2,874

or 47.45 per cent. of the total number broken, making a grand total of 88.7 per cent. of the knuckles now rendered useless because compelled to associate with their inferiors, and which might be saved to a life of usefulness if kept from evil company. Any one of an inquiring turn of mind can figure out what the saving would be.

There is this to be said for the benefit of those who long for the time when the common drawhead shall be a thing of the past. When that time has been reached there will, in all probability, still be occasions when something in the immediate vicinity of the drawbar *must* break. It had better be some part of the draft rigging than the sills, and the most economical sacrifice that can be offered is the knuckle. So that, even then, it will not be wise to fashion the knuckle any stronger than to be just the weakest part of the drawbar.

THE WEAR OF KNUCKLES.

In the issues of July 25 and Aug. 8, 1890, of the *Railroad Gazette* the question of the wear of M. C. B. knuckles, as it affected their liability to uncouple and the safety of a train equipped with them, was fully discussed. It may be of interest to note here some of the peculiarities of this wear.

Knuckles 3 and 5 were worn out in passenger service, and are fair samples of such knuckles. It is noticeable in each that the lower lug is much more worn than the upper. This again is the work of our acquaintance "drop." It is not at all unusual to find knuckles which have been in passenger service on which the lower lug is worn to such an extent that half the coupling pin hole is seen, as in knuckle 3, and all the way from a half to three-fourths of an inch of good metal left on the upper lug before the pin hole would be reached. Knuckle 5 would have had several thousand more miles of service in it if the wear had been evenly distributed between the two lugs, and the same could be said of half the knuckles now condemned in passenger service on account of wear. We have not as yet seen any knuckles that have been worn out in freight service, and do not know how the wear would be distributed, but it seems probable that it would be more even than in passenger service, as freight couplers are hung from the sills, and hence would have less drop than passenger couplers, which are mainly suspended from the platforms which are constantly dropping.

The useful life of nine-tenths of the knuckles in passenger service is ended by wear. We do not know that any uniform limit as to the amount of wear permissible has been adopted, though it is evident that such a limit must soon be established. At least one of the leading Western roads has fixed such a limit, having decided that all knuckles shall be condemned when worn to within a quarter of an inch of the coupling pin hole, and have construed this to mean that the average of the distance from the pin hole to the inside face of the upper lug and the same measurement on the lower lug is a fourth of an inch. For instance, this distance might be three-eighths of an inch for the upper lug and one-eighth for the lower.

It is worth noting in the records of the McConway & Torley Company, that there are but 57 worn-out knuckles reported, or .046 per cent. of those in service. In the case of the "worn outs" there is no special inducements for railroads to send them to the makers, as they are not exchangeable, as the broken knuckles are, but simply credited at their value as scrap. Hence it would not be safe to conclude that only .046 per cent. of the knuckles in service have been worn out. Experience has shown it to be a much larger percentage. Whether it be true or not that, because of flaws, the greatest percentage of breakages in a given lot of knuckles will occur during the early months of their service, it certainly is true that the percentage of those worn out will increase the longer they are in service. We have before us a record of broken knuckles, including those worn out, extending over the last year, which we believe to be carefully kept. As all the worn-out knuckles in it are from passenger service, it cannot contain any from foreign cars, nor can it well contain more than have actually been worn out. Of all the broken knuckles, the per cent. of those worn out is as follows:

First 3 months	0 per cent.
Second " "	16 " "
Third " "	24 " "
Fourth " "	34 " "

This is the proportion of knuckles worn out in passenger service compared with those broken both on passenger and freight cars. Assuming that the maximum percentage of knuckles worn out in passenger service has been reached, it does not follow that the maximum proportion of "worn outs" has been. The record, so far, does not show any knuckles worn out in freight service. When these begin to come in the proportion of those worn out will necessarily increase.

The records of knuckles worn out in freight service are too meagre to make it profitable to speculate as to what percentage of the cost of maintaining the couplers will be due to wear. It may, however, be in order to roughly approximate the mileage life of a freight car knuckle on the basis of the wear of knuckles in passenger equipments.

The life of a wrought iron knuckle on the tender of a passenger engine is about 30,000 miles. As the tender coupler is rigid, the wear of its knuckle would be greater than on those coupling passenger cars, say one-fifth

greater. Then the life of a coach knuckle will be 36,000 miles approximately. It is probably safe to assume that the wear of knuckes in passenger service is twice what is in freight service, and that the average yearly mileage of a freight car is 12,000 miles. This would make the mileage life of a freight car knuckle 72,000 miles, and it would be worn out in six years of service. This on the assumption that it escaped the prowess of the switchman.

Electrical Conveniences at the Central Railroad Station, Jersey City, N. J.

Electricity is now so common that the railroad man who is not familiar with many of its uses would be hard to find. Not only do we have the telegraph always at our elbow and constantly in use, but the conveniences afforded by the telephone and other apparatus are all the time spreading. The problems connected with getting valuable service out of this versatile servant are many of them now so simple that they have been worked out independently by numerous experimenters, and in presenting the accompanying description of an ingenious application of simple principles we do not pretend to be showing a remarkable novelty; but as a good example of skillful adaptation of means to ends, and of careful judgment in making all parts of a system complete, this case is worthy of note. As indicated by the title, the diagram shows the arrangement of electric circuits for conveying signals between various points in the yard of the Central of New Jersey passenger station at Jersey City, N. J. Frequent communication between these points is essential, and the present system dispensed with two messengers, while, at the same time, it added much to the smoothness of working.

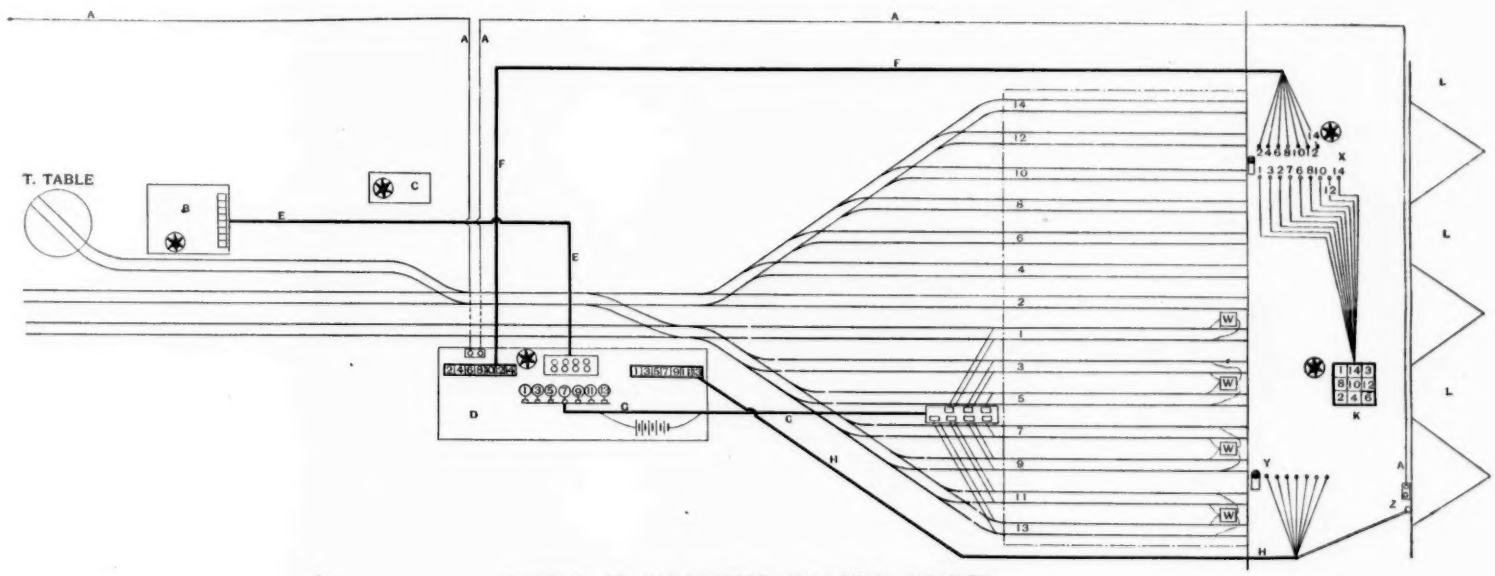


DIAGRAM OF ANNUNCIATOR AND BELL CIRCUITS.

Jersey City Station, Central Railroad of New Jersey.

The diagram, as will be readily seen, shows the train shed with the tracks in and leading to it. The outlines of the shed are indicated by dotted lines, but it must be borne in mind that no part of the diagram is drawn to scale, although the general arrangement is correctly shown. The principal distortions are the shortening of the train shed and the tracks in it, and the enlargement of the tower *D*, and of the electrical instruments located in the tower and other places. Several crossover and other tracks to the left of the tower are omitted.

The location of the tracks is readily understood by reference to the *pairs* of light lines. The heavy lines indicate cables carrying from 10 to 30 electrical conductors each.

A A A A A is a wire connected with a point on the track about 1½ miles out, to announce the approach of trains. The electric current in this rings a bell in the tower and another at the desk of the boat starter *Z*. *B* is the office of the man who orders engines to back into the train shed at the proper time to take out passenger trains. The turntable is some 2,000 ft. from the platforms, and until the present arrangement was introduced there was often considerable confusion and delay by reason of engines backing into the station at the wrong time or in irregular order. As suburban trains have to depart very close together, this was an important point. Now the engines invariably wait at *B* until they are notified that their respective trains are quite ready, thus avoiding unnecessary switching after going upon the main tracks. *C* is the yardmaster's office and *D* the interlocking tower. *E* connects the annunciators in *B* with the tower. *F* is the cable connecting the tower with the cabin of the platform man who directs the passengers to trains and who announces to the tower and to the train dispatcher the exact moment of departure of each train. *G* is the cable connecting the track circuits of the inward tracks with indicators in the tower, which show the tower man what tracks are occupied and w at are not. These circuits are worked by batteries located at *W W W W* in wells sunk in the ground. The annunciators are directly in front of the tower man, and when down are a constant warning against the possible mistake of letting two trains in upon the same track. *H* is a cable carrying conductors by which annunciators in the tower are dropped by the station baggagemaster, who by this means informs the man at the tower when all the baggage has been unloaded from an inward train and the cars are ready to be backed out.

K represents annunciators in the train dispatcher's office, which is located in the second story of the station. These are actuated by the platform man at *X*. *L L L* are the ferry slips and *Z* is the location of the boat starter. By means of wires through cable *H* the starter announces to the tower the exact time of the arrival of each boat from New York. As most of our readers are aware, practically the whole of the outward business at this station comes by ferryboat from New York. This being so, the yardmaster must have prompt information of every irregularity in the boat service. The average time required to discharge a boat and get the passengers and baggage into the cars being known with great precision, switching operations are much facilitated by the quick and easy communication from the ferry slip.

B, C, D, K and *X* are connected by telephone. All these telephones (indicated by stars) are on the same circuit.

Every signal is given reciprocally. For instance, when a train is ready to start from track 6 the man at *X* operates "plunger" 6 thus, by means of one of the wires in cable *F*, dropping annunciator 6 in the tower *D*. *D* in response rings a bell at *X* acknowledging the signal. In case of derangement of the circuit or apparatus *X* would resort to the telephone. It will be observed that this operation makes no noise at *D*. When this train starts *X* notifies *K* in a similar manner and gets a similar response.

The annunciators at *B*, instead of being numbered by tracks like the others, are lettered to indicate the *names* (not numbers) of the various trains for which engines are required. As generally not more than four trains are made up at any one time, eight annunciators are amply sufficient. All the annunciators are of the simple style common in hotels and sleeping cars.

The characteristic features of the system are the noiselessness, just referred to, and the use of separate wires for each operation. The first cost of so many conductors is, of course, high as compared with single circuits, over which communication could be had by telegraph, telephone or bell signals; but the facility and simplicity of operation is so much greater under the system adopted that its cost is regarded as amply justified.

Vertical Plane Couplers and Automatic Air Brakes.*

Mr. Barnes considered the present status of the vertical plane coupler and of the development of the air brake, and then the relations of the two to each other. The first part of his paper, in which he discusses particularly the vertical plane coupler, we shall give very briefly, as the same ideas have appeared in various editorials in the *Railroad Gazette* within the last six months.

VERTICAL PLANE COUPLERS.

Mr. Barnes starts out with the proposition that the vertical plane coupler is the best device for coupling cars that has ever been produced, and that it should be adopted by every railroad company; but that, from an economical and humanitarian standpoint, the air brake is the more essential of the two devices, and where but one can be applied to the equipment of a railroad the air brake should be adopted first.

In considering the contour diagrams were presented showing the angles made when coupled together by the stems of various couplers, the faces of which have different contours. One diagram showed a recent coupler coupled with one of the standard contour. When turned in one direction the maximum angle at the intersection of the axes of the stems was 17½ degrees; turned in the other direction the maximum angle was but 9 degrees. Such limitations of the possible angle are sure to cause trouble in going around curves. This question was discussed quite fully in the *Railroad Gazette* of Oct. 3, pages 678 and 684.

The effect of wear on couplers of different contours was also considered. This matter was also discussed at much length in the *Railroad Gazette* of July 25 and Aug. 8, and it will be unnecessary to give here even an abstract of this part of the paper.

Mr. Barnes discussed somewhat the question of gauges for measuring wear. Some sort of sliding gauge must be used which can be moved to accommodate itself to the difference in opening due to different amounts of wear. A model was shown of a gauge which records the position of the heel of the knuckle and of the guard arm, the thickness of the knuckle and relative position of the interior face of the knuckle and the bearing point on the guard arm. This gauge has been applied to a considerable number of couplers, registering as much as ⅜ in. increased opening due to wear. The conclusion from this part of the discussion is that the safe point of wear must be determined soon in order to get rid of the danger of trains uncoupling, and resulting discredit to the M. C. B. coupler.

The question of cost of service was next taken up. In the matter of cost of breakages Mr. Barnes presented nothing new except some data drawn from the records of 500 cars after five months' service. These records show five per cent. of the 1,000 couplers broken on the home line in five months, and they were off the line 60 per cent. of the time. Of the breakages one-half were knuckles in the pin hole. The cost would be $1.15 per car per year. This is for home line breakages alone.

It is assumed that the most serious element in the cost of service will be from wear. Whereas from records of breakages the life of a coupler may be estimated as 40 years in passenger car service, the life of the knuckle is from three to six months, because of the rapid wear. In freight service the life of a coupler may be taken as from 25 to 35 years, if we consider breakages only. How long couplers will wear in freight service cannot yet be determined, but Mr. Barnes is inclined to think that five or six years on cars averaging from 15,000 to 18,000 miles per year will render malleable iron coupler heads unfit for further use - and knuckles will not last as long as this. A longer life will probably be secured by the use of steel. The conclusion of this branch of the subject is that the cost of the vertical plane coupler in either passenger or freight service must be based upon wear rather than breakage, and that upon such a basis the annual cost per year will be greater than is now generally given; but not greater than may be considered reasonable, having in view the nature of the device and the service that it renders.

It is recommended that a standard unlocking device should be put into use. An inspection of any freight yard will show a large percentage of unlocking devices broken or disabled.

The question of coupling on curves and coupling cars of different lengths was taken up and discussed with the aid of diagrams. This question also was treated in the *Railroad Gazette* of Oct. 3 with much care, and we shall not give any of Mr. Barnes' discussion here.

AUTOMATIC AIR BRAKES.

In considering this branch of the subject, Mr. Barnes said there never was a time when the railroad companies needed to be so discriminating in the selection of brake apparatus as now. This is particularly true of the triple valve, and nearly all of the defects of the triple valve, if such exist, can be ascertained by laboratory experiments. He formulates the following standards of requirements:

First—Automatic action.

Second—Definite regulation of the initial application in service stops.

Third—Delicacy of graduation.

Fourth—Instantaneous emergency application by emptying the train pipe at each triple.

Fifth—Definite regulation of the pressure required for release.

Sixth—Restriction of recharging.

Seventh—Automatic regulation of the discharge of air from train pipe in service application.

. . . Definite regulation of the initial application of brakes in a service stop should be such as to allow the

* Extracts from a paper by Mr. D. L. Barnes, Editorial Staff of the *Railroad Gazette*, read at the December meeting of the Western Railway Club.

application of the brake in a service stop at the rear car of a 50-car train before the brakes at the front of the train have been applied with too great force, and also to prevent the application of a portion of the brakes in the train while others are not yet applied.

Delicacy of graduation should be such that the pressures in the brake cylinders of a 50-car train may be uniformly increased by easy stages after the first application is made in a service stop.

Instantaneous application for emergency stops should be sufficient in any case to apply all the brakes in a 50-car train so quickly and so fully as to prevent the cars from running into each other or to prevent the rear of the train from running into the front when the train parts, say two seconds.

Regulation of the minimum pressure required to release brakes is needed to sufficiently retard the release to prevent the brakes in one part of the train from releasing while the others remain on.

Regulation of the rapidity of recharging is an absolute requirement to prevent the brakes in the front of the train from charging too quickly and thereafter being applied by the rapid charging of the rear of the train.

Further than this, the standard templet for the seat of the triple valve on the air reservoir as established and maintained by the Westinghouse Air Brake Co., as well as the standard diameters and strokes of the cylinders and capacities of the auxiliary reservoirs, should be insisted upon in order that a given reduction of pressure in train pipe may apply the brakes of whatever type on all cars with equal force, and the triples should be such in action that for equal reductions in train pipe pressure they would admit equal pressure into the brake cylinders and have identical action under all conditions of service.

A firm and decisive move on the part of the M. C. B.

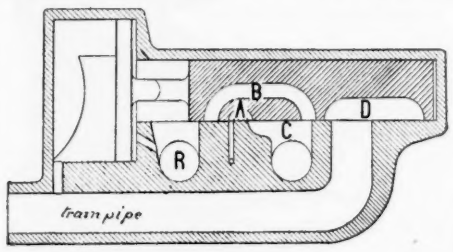


Fig. 1.

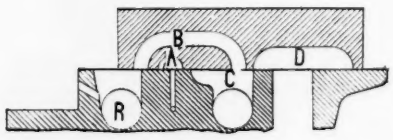


Fig. 2.

Fig. 3.

Association at the present time would prevent any possibility of a repetition of the chaotic state and incident difficulties and expenses with power brakes that was formerly had with couplings. . . . A committee might be appointed to examine and pass upon all air brakes offered for use before they should be adopted by any railroad company. The expense of such examination and inspection by a committee would be but a small fraction of that which will be incurred by railroad companies if they are to continue to experiment independently, either on a large or small scale, with the various brakes which are now being invented and proposed.

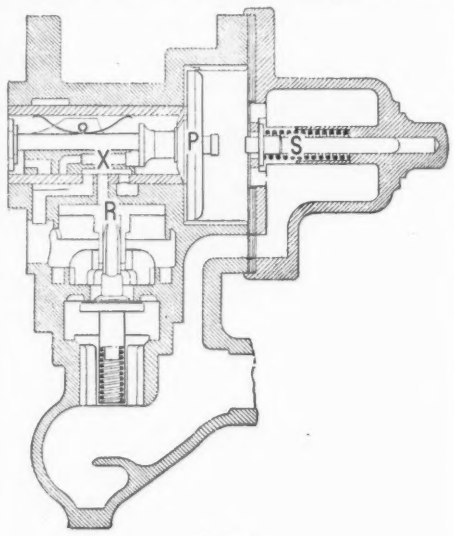
Four drawings of typical triple valves were then taken up and discussed as follows :

For instance, here is a triple (fig.'s 1, 2, 3) made of only two parts which has all of the main functions demanded by the standards, even to the quick action features, but which is utterly useless for practical purposes.

It has the exhaust passage, the graduation feature, and the emergency opening admitting air from the train pipe to the brake cylinders direct. As the piston moves down, due to the reduction of train pipe pressure, the exhaust is closed by closing of the passage *A*; air is admitted from the auxiliary reservoir to the cylinder through the passages *B* and *C* (fig. 1), and when a further reduction is made the piston moves down until the large passage *D* connects the train pipe and the brake cylinder (fig. 3). Also at this time the graduation passage *B* is open to the brake cylinder. In this way all of the actions which take place in the best triples would take place in such a valve as this. It could be claimed for this valve that it was simple, as it has only two parts ; and also there are many other claims commonly made for triples which would be borne out completely by this design. You may think it rather unnecessary to show this, but the reason will be clear when it is stated that there are triple valve patents in the market for sale which are more ridiculous than this one, and which have not the advantages which this valve possesses.

The difficulty with this valve is that its actions are not under control. There is no certainty when it starts to go on whether it will go to the full emergency stop position or to a graduating position, and if it moves back to graduate it may go further than it is intended that it should and blow off the brakes completely . . .

The remaining three triples have been designated A, B and C. . . . All of these valves have a piston which is moved by air pressure. When the pressure in the train pipe is reduced the piston moves outward, and when the pressure is increased again it moves inward. To the stems of the pistons of valves A and B are connected slide valves, but connected in such a way that the piston can move about one-eighth of an inch in each direction without moving the slide valve. This might be called the *back lash* of the slide valve, and has a very important function, as will soon appear. The slide valve is held to its seat in both cases by a spring and by the air pressure, and being so held it evidently will offer some resistance to motion. Now, the piston, itself being of large area and well fitted in the cylinder, moves with extreme freedom. In fact, a minute reduction in the train pipe causes this piston to move down and take up the back lash between this stem and the slide valve. This movement in the case of valve A closes the feeding-in port, so also in case of valve B. It is essential that the valve be very delicate at this point, otherwise some considerable amount of air might flow from the reservoir out through the feeding-in port, into the train pipe, and thus interfere with the application of brakes on long trains. As soon as the feeding-in port is closed and the back lash is taken up, the piston meets with a distinct retardation, caused by the friction of the slide valve on its seat. This is necessary in order to ob-



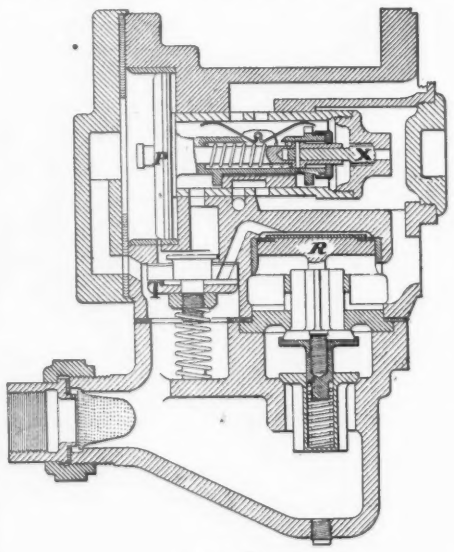
Valve A.

tain *definite regulation of initial application* by retarding all the valves in a long train and compelling a considerable reduction in the train pipe before any of the valves are applied, that is, by means of this friction of the valve a much more uniform action of the brakes in the train during the first application is obtained.

The pressure now being sufficiently reduced, the piston pulls the slide valve down until a small port is opened between the cylinder and the air reservoir. Air rushes then from the reservoir to the cylinder until the pressure has been reduced above the piston, just a little below what it is on the train pipe side of the piston, then the piston returns, but as soon as the back lash is taken up it meets a resistance in the form of the friction of the slide valve and its motion is arrested; but at this time the little spindle valves shown at *X*, close the passage between the auxiliary reservoir and the brake cylinder and further passage of air into the cylinder is prevented and the valve remains at rest and perfect equilibrium. This action being free and untrammeled gives *delicacy of graduation*.

Now, the object of this slide valve becomes apparent. If it were not here and did not offer resistance to the return of the piston, then the piston would continue to move after starting back until the passage from the cylinder to the atmosphere was opened and the brakes would be released. This action gives *definite regulation of release*.

It requires considerable increase of pressure in the



Valve B.

train pipe above that in the reservoir to drive the slide valve back to the released position, or to pull it on in the first application. Hence, the office of the slide valve is seen to be primarily :

(a) To retard the action of the piston in order to obtain a standard first application.

(b) To retard the return movement of the piston so as to obtain the standard release.

It is seen that this is accomplished by allowing the piston to move to some extent independently of the slide valve, and when fitted carefully and of sufficient area the piston moves at every extremely small difference in pressure, and this freedom of action gives

(*a*) instantaneous closing of feeding-in groove.

(*b*) a standard delicacy of graduation.

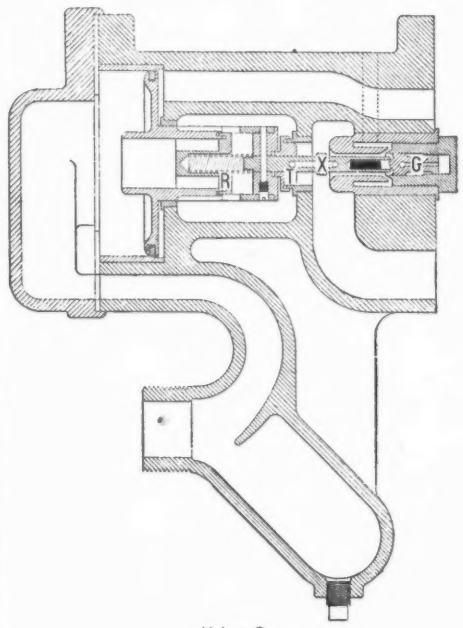
So far then, valves A and B are practically identical, each having a slide valve and each a spindle graduation valve.

Now with regard to the emergency or quick acting feature. When the piston moves out for the first time, dragging with it the slide valve to make the first application, it might travel beyond the desired point and cause an emergency stop by allowing air to be blown through the ports in the face of the slide valve to the back of the pistons *P* actuating the emergency valves. These emergency valves are shown to be identical in construction in two valves A and S. In the valve A, however, as soon as the piston has pulled the slide valve to the graduation position it brings up against a spring *N*. This spring retards further movement of the slide valve until the pressure has been reduced in the train pipe to about 20 pounds per square inch, when it is desired that the emergency application take place. This great difference in pressure acting on the piston compresses this spring, the slide valve is then dragged further down and a small puff of air blows the piston *R* out and opens the emergency ports.

With the valve B the piston moves directly to the end of its stroke for graduation. The emergency action takes place when the desired reduction is made in the train pipe pressure. This reduction causes the valve *T* to lift from its seat and admit a small puff of air to the back of the piston, and opens the emergency valves just as described in the case of valve A. The action of the valves A and B then are almost identical except that one has a few more parts than the other to accomplish the same end. In one the *air in the auxiliary reservoir* actuates directly the piston which opens the emergency valves. In the other the air in the auxiliary reservoir actuates a small piston which in turn opens a small port, admitting the *train pipe air* to actuate the emergency valve.

The valve C differs from A and B considerably. It has a friction device in the place of a slide valve, consisting, as shown, of a slotted spring end on the stem, working in a cavity with the necessary back lash. The charging port automatically closes. A small piston packed with leather closes the exhaust to the atmosphere, and the graduation is performed through a passage leading through the stem of the valve, as shown at *X*. Delicacy of graduation in this valve is maintained by increasing somewhat the diameter of the piston to overcome the friction of the small leather packed piston and the air pressure against the area of the graduating stem. The emergency feature is obtained by the piston pulling the large valve *T* off of its seat. The resistance of this valve is made to hold the piston until the desired reduction in train pipe pressure is reached.

The charging is accomplished by the air passing



Valve C.

through the emergency check valve and then through the contracted port in the body of the piston.

The air from the train pipe in an emergency stop opens the central check valve in the piston at *R* after the other emergency valve has been pulled off its seat by the movement of the piston.

This triple does not resemble valves A and B in construction, but may be made to act, with proper regulations of the size of the openings, in a similar manner.

To distinguish between these three valves is the next logical step, and rather a difficult one.

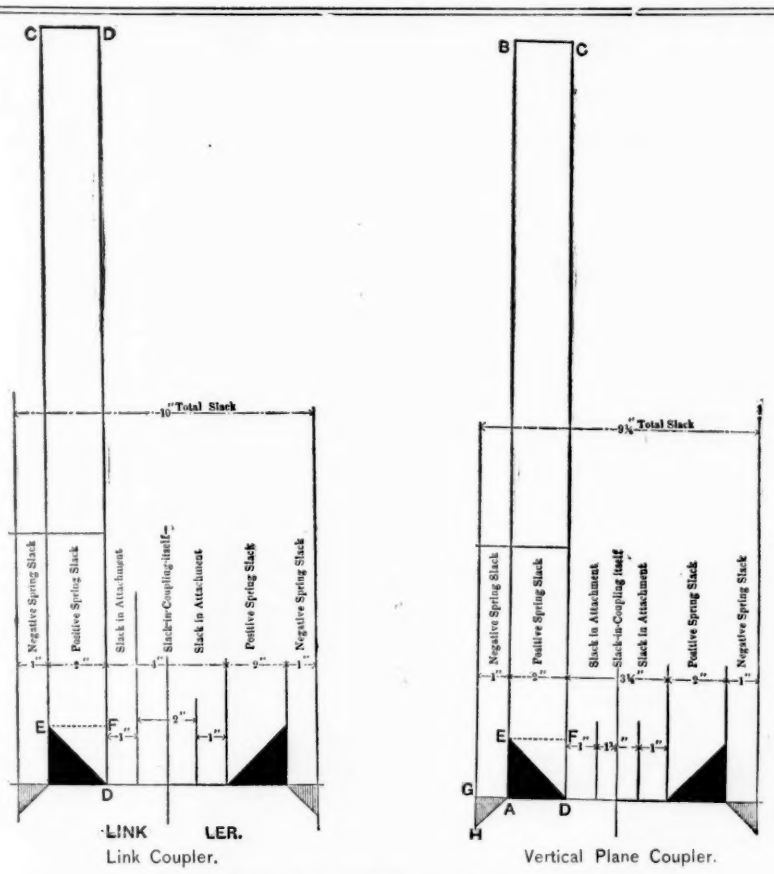
Valve A is one with which we are all familiar. It has been most thoroughly tested by the majority of railroad men here present. Its action is well understood, and it is known that it complies with the standard requirements. This is conceded by its competitors, and it may be taken as the standard valve to-day for two reasons.

First, at the time of the Burlington brake tests some of the features of its action were so satisfactory that they were recognized as essential. I refer now to the retardation of the first application and release, to the delicacy of graduation, and to its mechanical construction.

Second, since the inauguration of the Burlington experiments, which taught what the standard should be, this valve A has been remodeled to meet the requirements then shown to be necessary.

. . . There is a difference in the standard requirements of freight service and passenger service. There is a difference in the passenger and freight triple in the charging groove. The longer the train the smaller must be this groove or the brakes will not be charged uniformly, and unless uniformity be had there is a liability that the head brakes in the train will stick on while the rear ones are being charged; hence, this groove is larger for the short trains of passenger service than for the long trains for freight service. Stiffer graduation springs are now used than originally in order to make a greater difference between a service and an emergency application. This reduces the number of emergency applications made by green engineers with the old engineer's valve. . . .

The result of the introduction of grit into these valves can only be satisfactorily determined by long service. The slide valve used in both A and B is probably the best form of valve to keep tight and to exclude grit under the conditions of brake service, and in this respect these valves are alike. The spindle valve for graduation is better arranged in valve A than in valve B to prevent



Link Coupler. Vertical Plane Coupler.

DIAGRAMS WITH MR. BARNES' PAPER ON COUPLERS.

leakage from grit, for this reason: When the spindle in valve A returns to its seat it meets a definite resistance made up of inertia of the slide valve and the friction of the same. This blow is generally sufficient to crush or drive out any grit that might be on the seat of the spindle valve. In the case of valve B, it is compressed to its seat only by a very slight spring. There is no blow against the seat, and the pressure of the spring is not sufficient to drive out or crush the grit so completely as in the case of the valve A. If this spring were made stiff enough to do this, then there would be a defect in the retardation of the first application and retardation of release. This is evident from an inspection of the drawings, which show that a heavy spring placed at this point would continually act to push the slide along to a service application and counterbalance its friction.

The emergency valves are so exactly alike in A and B that the difficulties resulting from grit must be identical, but the emergency application is supposed to be made only at rare intervals; therefore, the liability of derangement from grit should be small.

The device for actuating the emergency valves consists in valve A of a port in the face of the slide valve, and therefore there is no additional danger of derangement due to grit. In valve B there is an additional valve to actuate the emergency valves. There is, therefore, one more seat to keep tight. This seat is of a kind that traps dirt most readily, and a leak at this point admits air to the emergency piston *R*, which is leather packed, and would cause an emergency application of brakes when not desired.

The valve C is materially different from the others in design and a little in general operation. In recharging the air passes through the emergency check valve at the centre of the piston. With the old style of this valve, as shown by repeated experiment, the front of the train charged very much quicker than the rear. In fact, the front was charged in about two seconds. The rear of the train, when equipped with valve A, required some considerable time to charge. The result was that after the first pulse of charging from the main reservoir and the pressure in the train pipe had decreased, this reduction caused the brakes in the front of the train, which was already charged, to apply, and unless an engineer was familiar with this peculiarity he would find the brakes on the front cars sticking on while the rear ones are off. But in the new design just issued and shown here the charging port between the emergency valve and the reservoir is so much reduced that charging goes on as slowly as may be desired.

With regard to grit, the graduation feature of the valve C would seem to equal that of valve A, but in point of wear there is a difference. The stem must remain tight in the centre of the valve, and there is no automatic take-up of wear such as there is with the slide valve. A leak at this point has the effect of permitting the brakes to set harder after the initial application. But this also to some extent is true of valve A after it has been used for a considerable period of time.

If the large emergency valve is used as a feeding in port, then, owing to its large area and flat seat, it may be kept open by grit, as it is only pressed to its seat by a light spring. An attempt has been made to remove this difficulty by the use of a peculiar seat with a soft packing. This may reduce the trouble from grit, but also induces a liability of increased wear. I cannot say that this style of valve and valve seat removes the liability to derangement from grit; but I know that some considerable trouble is experienced with the soft backing in the emergency valves of triple A.

If this large valve in triple C is kept open by grit, or for any other reason, the air may pass directly through the valve without blowing the piston to the released position, and the brakes would stick on, as the brake cylinder and reservoir would be charged to the train pipe pressure at the same time; or if this valve does not leak, but if the piston sticks by reason of the brakes having been out of use for some time or because of ill-fitted piston rings or frozen condensation, the same result will be had and the brakes cannot be released.

This is a point of marked difference between triples A and B and triple C. Triple C has not a positive provision which compels the piston to return to the released position before recharging takes place as the case is with valves A and B. The action is dependent upon the spring holding the emergency valve to its seat.

Up to the present time this valve has been arranged without the retarding device shown at *G*. It had no definite point of application and no definite point of release. It acted in an erratic manner and would come on or go off when it was not intended that it should. This retarding feature has been recently added, and as the valve now stands its theory of action meets the standard requirements; but, as in the case of valve B, there needs to be some authentic experiments to show clearly that the dimensions are such as to practically comply with the standard, and this is the work which it is suggested should be allotted to an M. C. B. committee.

Before leaving this subject there is one other point to which I wish to call your attention. It is the necessity for the best possible workmanship. A badly constructed triple, however correct may be its principle of action, is not cheap at any price. Its sluggish action and its leaking may cause more damage than ten times its cost. I think I am safe in saying that the air brake triple requires a higher class of workmanship than any other device to be found on a modern railway train.

The paper closes with a discussion of the question of the interdependence of the air brake and the vertical plane coupler. This branch of the subject is opened by a quotation to the effect that, "in spite of expenditures for standard couplers, we find that we must run our trains with link-and-pin couplers interspersed with the vertical plane couplers, giving more slack than if we were using link-and-pin couplers alone. The result is that if we must wait until cars are largely equipped with vertical plane couplers before we can use the air brake, it will be a long time before we can get the advantages of said brakes." Mr. Barnes believes that with the quick-acting brake link-and-pin coupled trains can be satisfactorily handled, and quotes a letter from the Westinghouse Air Brake Co. to the effect that his position is thoroughly tenable theoretically, and as a matter of practice probably four-fifths of all of the 156,000 sets of brake equipment on freight cars are now used on cars that do not have the vertical plane coupler, and up to the present time they have been worked with at least relative success. Probably better results will be had when the vertical plane coupler is more generally used. As a matter of fact, this question has never been raised by those who use the air brakes. Therefore the Westinghouse company concludes that the adoption of tight couplers is not essential to the proper operation of power brakes.

Mr. Barnes proceeds then to show the relative amounts of slack in trains having the two kinds of coupler; although there is no necessity for severe shocks in trains, even with considerable free slack under service brake applications. Such shocks are due to carelessness, and should not be permitted any more than any other carelessness in an engineer. Even with emergency applications the train can be bunched by preliminary application and shock avoided.

By the aid of a diagram the relative amounts of slack and the comparative effect of spring and free slack were shown.

Slack between cars may be divided into three kinds: free slack, positive spring slack, and negative spring slack. When cars are new there is about 2 in. of spring slack to each coupler, and ¼ in. at least additional slack in the drawbar attachment. The vertical plane coupler has, when new, about ⅝ of an inch free slack in itself. In a new vertical plane coupler there is, therefore, 4¼ in. of total slack, 4 in. of which is spring slack.

Supposing that a vertical plane coupler is discarded from freight service after the knuckle has worn ½ in.; if two couplers worn to that extent come together the free slack will be not far from 1¾ in., depending upon the wear on the lock. The total slack will then be 6¼ in., 4 in. of which is spring slack and 2¼ in. free slack. By this time the outer face of the knuckles will have become worn, increasing the free slack by perhaps ½ in. The draft rigging will also have become loosened and the draft springs set, so as to increase the free slack to about 1 in. for each coupler, or, say, 2 in. between the cars. Therefore the slack between the two cars with vertical plane couplers after considerable use may be taken as 7¾ in., viz., 4-in. spring slack, 2 in. in the attachments, 1¾ in. in the coupler itself. Hence, in considering the question of train brakes, even with the vertical plane coupler, we must allow 3¾ in. of perfectly free slack and 4 in. of spring slack.

The position of couplers at the time when the most difficulty is experienced from shocks during the brake applications is when the locomotive is pulling out and the drawbars are extended. There is at that time a slack which is worse than a free slack, because the cars are actually drawn together by the force of the draft springs when the brakes are applied. This slack may be termed negative slack, as it acts directly opposite to positive spring slack, found during compression of the springs at the time the shocks are produced. Thus the total slack found as before is to be increased by about 2 in. to allow for the negative slack when the engine is pulling out. Considering this negative slack as not more injurious than free slack, there is a total of 9¾ in. of slack at times when emergency applications are made with well worn cars and vertical plane couplers, of which 4 in. is spring slack and 5¾ in. is free slack. If trains cannot be properly braked with this amount of slack, there is only one recourse, and that is to improve the draft rigging. Further improvement of the coupler will be fruitless.

With link-and-pin couplers we may assume that there will be, provided the coupler is as carefully watched as the vertical plane coupler, about 14 per cent. more free slack and 8 per cent. more total slack than with the vertical plane coupler.

Before making a final comparison it will be well to consider the relative effects of spring and free slack in producing concussions. If one loaded 60,000-lb. car is standing and another is run against it at a speed of about 1½ miles per hour, the draft springs of the ordinary type, having a capacity of 20,000 lbs., at 2 in. compression, will close together. When cars come together at a difference in speed of about 6 miles per hour, the shocks are serious, and are such that it is necessary to avoid them in emergency applications of brakes.

If the draft springs close at a speed of 1½ miles per hour, then they are not effective for higher speeds than this except for empty cars. The work to be done to overcome shocks varies as the square of the difference in speed of the cars, and at 6 miles per hour it is about 16 times as great as at 1½ miles per hour. Therefore, while spring slack has its uses and is not as detrimental as free slack, yet its effect in reducing the serious shocks in brake application is sometimes overestimated, and in sudden emergency applications of brakes on trains of mixed cars the shocks under otherwise equal conditions are approximately proportional to the total amount of slack rather than to the free slack alone.

Just what is the real ratio of the effects of different amounts of slack it is not necessary to state here. It is a complicated mathematical question and would hardly aid in this discussion. The point to be made is only that in comparing the effects of two coupling devices the total amount of slack should be considered and not the free slack alone.

On the diagram is indicated the amount of work stored in a loaded 60,000-lb. freight car, moving at a speed of only *three* miles per hour. See area A B C D. The paper on which the diagram is shown is not long enough to show the stored energy at six miles per hour. There are also shown the amounts of energy which would be absorbed by the two draft springs when the cars come together. See area A E F D. From this we can learn the value of spring slack in reducing shocks. The energy absorbed by the springs bears the same ratio to that in the moving car at three miles per hour as the area A E F D bears to the area A B C D. Hence it is shown that spring slack is but little better than free slack in reducing severe shocks, and that the shocks are more nearly proportional to the total slack than to the free slack. This is even more the fact if from the area A E F D be deducted twice the area of the triangle A G H. This triangle being the graphical representation work done by the negative slack in pulling the train together. The effect of negative slack is less at the rear than at the front of the train.

I have tried to separate the two devices, the air brake and the coupler, and to show that the use of the one does not necessarily *compel* the use of the other, and further that if we expect to have trouble with air brakes on closely coupled trains, with the link and pin, we shall have nearly the same trouble with well worn vertical plane couplers.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

STANDARD TRESTLE PLANS, CHICAGO & WEST MICHIGAN RAILWAY.

The accompanying figures show the standard plans for trestling as adopted on the Chicago & West Michigan Railway and the Detroit, Lansing & Northern Railroad, J. J. McVean, Chief Engineer. The designs as a whole are excellent. In one or two details they might be somewhat improved, notably in the form of stringer joint.

Fig. 1 is the standard plan for pile trestles, while fig. 2 shows that for framed trestles. Fig. 3 gives the details of the cast-iron separators and washers.

The guard rails are of a very good size, 8 in. × 10 in., with narrow face up, notched 2 in. over the ties, and are bolted through every fourth tie and the jack stringers by ¾-in. × 32-in. bolts. The upper edges of the guards are beveled. This is rather objectionable, as it really reduces the effective height and tends to increase the chances of the wheels mounting and overriding them in case of a derailment. The ties are 6 × 8 in. × 12 ft., notched ⅛ in. over the stringers. The size of the stringers depends upon the span of the bays as given, in the following list:

Span.	Size of pieces.
12 ft.	6 in. × 16 in. × 24 ft.
14 ft.	7 in. × 16 in. × 28 ft.
16 ft.	8 in. × 16 in. × 32 ft.

The track stringers are each composed of two pieces breaking joints and packed together by ¾-in. bolts and

* Copyright 1890, by W. C. Foster, and condensed from his forthcoming book on the same subject.

cast iron separators. The jack stringers are of the same section as the track stringer pieces. The stringers are all drift bolted to the caps, five drift bolts to each cap.

The caps are 12 in. × 12 in. × 14 ft. In the pile bents they are connected to the piles with a mortise and tenon joint in new work, but drift bolted in repairs. In framed bents the posts and caps are joined by mortise and tenons.

The sway braces, which are of 3-in. × 12-in. plank, are bolted and spiked to the posts or piles, caps and sills.

Where it is necessary to use sub-sills as foundations for framed bents they are made of 12 in. × 12-in. timber, 6 ft. long, six to each bent.

The following are bills of material for one bent and one bay of both pile and framed trestles:

PILE TRESTLE—ONE BENT AND ONE BAY—12 FT. SPAN.

BILL OF TIMBER.

Name.	No. of pieces.	Size.
Floor System.		
Guard rails	2	8 in. × 10 in. × (12 ft.)
Ties	10	6 in. × 8 in. × 12 ft.
Stringers	6	6 in. × 16 in. × 12 ft.; 24 ft. for two or more span bridges).
Bent.		
Cap	1	12 in. × 12 in. × 14 ft.
Sway braces	2	3 in. × 12 in. × — ft.
Piles	4	

BILL OF IRON.

Name.	Size.	No. of pieces.	Use.
Bolts	¾ in. × 32 in.	6	Guard rails to ties and jack stringers.
Bolts	¾ in. × 16½ in.	8	Stringer joints.
Bolts	¾ in. × 18 in.	8	Sway braces.
Drift bolts	¾ in. × 24 in.	5	Stringers to caps.
Boat spikes	⅜ in. × 7 in.	20	Sway braces.
Cast washers	¾ in. × 3½ in.	41	Under heads and nuts of bolts.
Cast separators	— in. × 2 in.	8	Between stringer pieces.
In repairs add:			
Drift bolts	¾ in. × 20 in.	4	Caps to piles.

14-FT. SPAN—BILL OF TIMBER.

Name.	No. of pieces.	Size.
Floor system.		
Guard rails	2	8 in. × 10 in. × (14 ft.).
Ties	12	6 in. × 8 in. 12 ft.
Stringers	6	7 in. × 16 in. × (14 ft.; 28 ft. for two or more span bridges).
Bent.		
Same as for 12-ft. span.		

BILL OF IRON.

Same as for 12-ft. span, except that bolts for stringer joints are 18½ in. long instead of 16½ in.

16-FT. SPAN—BILL OF TIMBER.

Name.	No. pieces.	Size.
Floor system.		
Guard rails	2	8 in. × 10 in. × (16 ft.).
Ties	14	6 in. × 8 in. × 12 ft.
Stringers	6	8 in. × 16 in. × (16 ft.; 32 ft. for two or more span bridges).
Bent.		
Same as for 12-ft. span.		

BILL OF IRON.

Same as for 12-ft. span, except that bolts for stringer joints are 20½ in. long instead of 16½ in. Add, also, two bolts ¾ in. × 32 in., guard rails to ties and jack stringers, and four cast washers for the same.

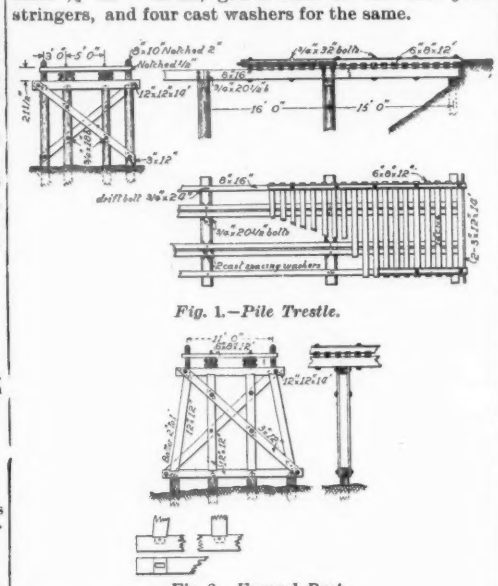


Fig. 1.—Pile Trestle.

Fig. 2.—Framed Bent.

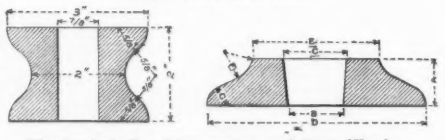


Fig. 3.—Details of Separator and Cast Washers.

Standard Trestles, Chicago & West Michigan Railway.

FRAMED TRESTLES.

Bills of timber for floor systems are the same as for pile trestles. For bents use the following:

Name.	No. pieces.	Size.
Cap	1	12 in. × 12 in. × 14 ft.
Posts, vertical	2	12 in. × 12 in. × — ft.
Posts, batter	2	12 in. × 12 in. × — ft.
Sill	1	12 in. × 12 in. × — ft.
Sway braces	2	3 in. × 12 in. × — ft.
For pile foundations.		
Piles	4	
For sub-sill foundations.		
Sub-sills	6	12 in. × 12 in. × 6 ft.

Bills of iron are the same as for corresponding pile trestles.

The weights of the iron details are as follows:

Bolts, ¾ in. × 18½ in	2¾ lbs. each.
Bolts, ¾ in. × 32 in	4⅝ " "
Drift bolts, ¾ in. × 20 in	2⅜ " "
Drift bolts, ¾ in. × 24 in	2¾ " "
3 boat spikes, ⅜ in. × 7 in	1 "
Cast washers, ¾ in. × 3½ in	1¼ " each.
Cast separators, — × 2 in	2½ " "

The proportions of the cast washers, fig. 3, vary with the diameter of the bolts for which they are intended and are as given in the following table:

Bolt.	A	B	C	D	E	F	G	Weight.
In. — In.	In.	In.	In.	In.	In.	In.	In.	Lbs.
⅝ — ¾	¾	⅞	1	3½	2	½	⅛	1¼
⅞ — 1	1	1⅛	1¼	5	2½	⅝	⅛	
1⅛ — 1¼	1¼	1⅜	1½	6	3	¾	⅛	
1⅜ — 1½	1½	1⅝	1¾	7¼	3½	⅞	⅛	
1⅝ — 1¾	1¾	1⅞	2	8½	4¼	1	⅛	
1⅞ — 2	2	2⅛	2¼	9½	5	1¼	¾	

The Year's Railroad Building.

We give in this issue our annual record of the track laid in the United States, Canada and Mexico during the year. The matter published is a compilation of news that has appeared in our construction columns. It is evident that a table published a day after the close of the year cannot record, in all instances, the actual mileage laid, but where tracklaying is in progress an estimate has been made. The track laid by the Burlington & Missouri River road and other lines, though not given in detail in the table, is included in the totals. The following is a summary by states:

Alabama	338	North Dakota	38
Arizona	3	Ohio	154
Arkansas	67	Oregon	35
California	97	Pennsylvania	238
Colorado	216	Rhode Island	12
Florida	106	South Carolina	186
Georgia	392	South Dakota	153
Idaho	64	Tennessee	166
Illinois	114	Texas	189
Indiana	88	Utah	88
Indian Ter	85	Vermont	14
Iowa	7	Virginia	205
Kansas	85	Washington	362
Kentucky	189	West Virginia	98
Louisana	137	Wisconsin	75
Maine	41	Wyoming	134
Maryland	47		
Massachusetts	14	Total U. S.	5,967
Michigan	195	British Columbia	34
Minnesota	102	Manitoba	87
Mississippi	80	New Brunswick	22
Missouri	115	Northwest Ter	316
Montana	419	Nova Scotia	43
Nebraska	298	Ontario	92
New Hampshire	24	Quebec	57
New Jersey	59	Mexico	498
New Mexico	105		
New York	39	Total Foreign	1,127
North Carolina	291	Grand Total	7,094

NEW RAILROAD CONSTRUCTION—JANUARY 1, 1890 TO JANUARY 1, 1891.

Name of Road.	Track laid between Jan. 1 and Dec. 31. From.	To.	Miles.	Under contract or construction. From.	To.	Miles.	Projected for next season. From.	To.	Miles.
Abeville & Waycross	Abbeville, Ga.	Bowen's Mill, Ga.	13				Oscilla, Ga.	Du Point	50
Ahnapee & Western							Near Cusco, Wis.	Anhapee, Wis.	14
Alabama, Georgia & Florida							Quincy, Fla.	Bessemer, Ala.	300
Alabama Midland	Troy, Ala.	Ramer, Ala.	26						
" "				Rutledge, Ala.	Julian, Ala.	4			
Alabama Mineral	Sylacauga, Ala.	Calera, Ala.	32.7						
Albany, Florida & Northern	Albany, Ga.	Cordele, Ga.	35						
Albemarle & Pantego	End of track	Pantego, N. C.	4 5						
" "	Pantego, N. C.	Belle Haven, N. C.	4.5						
Alton Terminal	In Alton, Ill.		.25						
Aransas Pass Terminal				Rockport, Tex.	Harbor Island	10			
Arkansas & Gulf							Pendleton, Ark.	Lake Village, Ark.	85
Arkansas Southern							El Dorado, Ark.	Louisiana State Line	15
Astoria & South Coast	Carnahan's Junc., Or.	Grimes' Hotel, Or.	12				Glencoe Junc., Or.	Near Linnton Sta., Or	13
" "							Seaside Junc., Or.	Hillsboro, Or.	67
Atchison, Topeka & Santa Fe	Ardmore, Ind. Ter.	Texas Coal Mines	4.5						
Southern California	San Bernardino, Cal.	Cram's, Cal.	9.3						
Atlantic Coast Line—									
Wilmington & Weldon	Greenville, N. C.	Kingston, N. C.	28				Kingston	Jacksonville, N. C.	35
" "							Spring Hope, N. C.	Raleigh	35
" "							Greenville, N. C.	Washington	20
Wilming., Col. & Aug.							Fayetteville, N. C.	Rowland, N. C.	41
Manchester & Augusta							Santee River, S. C.	Augusta, Ga.	
Atlantic & Danville	Mayo, Va.	Vivarve, N. C.	12						
" "	Atkins Junction, Va.	Buffalo Springs, Va.	4						
" "	Belfield, Va.	Hitchcock's Mills, Va.	10						
" "	Savedge, Va.	Alcott's Mills, Va.	8						
Atlantic & Pacific	Powells, Ariz.	Colorado River	3						
Atlantic & Western of Florida									2
Baltimore & Drum Point				*Baltimore, Md.	Drum Point, Md	80.			
Baltimore Belt				Camden Sta., Balto.	Bayview Junc., Md.	7			
Baltimore & Eastern Shore—									
" " "	Easton, Md.	Salisbury, Md.	42				Easton, Md.	Cambridge Ferry, Md.	12
" " "	St. Michaels, Md.	Claiborne, Md.	5						
Baltimore & Ohio—									
Akron & Chicago June.	Akron, O.	West	15	End of track	Chicago June., O.	54			
Beaver & Ellwood	Ellwood Junc., Pa.	Ellwood, Pa.	3						
Beebe, Des Arc & Brinkly							Beebe, Ark.	Des Arc, Ark.	50
Bellingham Bay & British Columbia	Whatcom, Wash.	No. of Nooksack Riv.	23						
Birmingham & Atlantic	Renfroe, Ala.	Cooks Co. Mines	12						
Birmingham, Sheff. & Tenn. River	Jasper, Ala.	South Parish, Ala.	9.5						
" " " "	Margerum, Ala.	Riverton, Ala.	11.				South Parish	Warrior River	20
Bluefield & Princeton							Bluefield, W. Va.	Princeton, W. Va.	12
Bristol Belt	At Bristol, Tenn.		2.				At Bristol		7
Bristol, Elizabethton & N. C.	Bristol, Tenn.	Elizabethton, N. C.	22.				Elizabethton	Mountain City, N. C.	40
Blue Mountain Mineral	Anniston, Ala.	Jacksonville, Ala.	17						30.
Brunswick, Athens & Northwestern	Near Stillmore, Ga.		5.				Stillmore, Ga.	Reidsville, Ga.	
Buffalo Dock & Connecting							Hamburgh Can'l, N. Y.	C. Line, Buffalo, N. Y.	7.
Buffalo, Lackawanna & Pacific							Buffalo, N. Y.	Niagara Falls, N. Y.	25
Cache Valley	Sedgwick, Ark.	Jack, Ark.	20.						
California	Mills College	Leona, Cal.	1	Leona, Cal.	Meyer's Peak, Cal.	1			
Canadian Government Roads—									
Cape Breton	Point Tupper, N. S.	No. Sydney, N. S.	18						
Canadian Pacific	Souris, Man.	Airdrie, Man	16	Airdrie, Man.	Melita, Man.	27	Stratherne, Man.	Souris, Man	23
" "	Glenboro, Man.	Stratherne, Man.	21.3						
" "	Mission, B. C.	Huntingdon, B. C.	10						
Calgary & Edmonton	Calgary, Alberta	Red Deer R., Alberta	93	Red Deer River	Edmonton	97	Calgary	McLeod, Alberta	110
Columbia & Kootenay				Sproats Landing	Nelson, B. C.	28			
Qu' Appelle, Long L., Sask.	End of track, 1889.	Prince Albert, N. W. T.	136						
Cape Fear & Cincinnati							Wilmington, N. C.	Salisbury, N. C.	220
Cape Fear & Yadkin Valley	Roseboro, N. C.	Fayetteville, N. C.	22	Mt. Airy, N. C.	State line	7			
" " "	Millboro, N. C.	Ramseur, N. C.	9.2						
" " "	Mt. Airy, N. C.	Flat Rock, N. C.	2						
Carolina Southern							Cheraw, S. C.	Sumter, S. C.	62
Castle Valley							Price, Utah	Cottonwood Cañon, U.	50

*Work suspended.

NEW RAILROAD CONSTRUCTION—JANUARY 1, 1890 TO JANUARY 1, 1891—Continued.

NAME OF ROAD.	Track laid between Jan. 1 and Dec. 31.			Under contract or construction.			Projected for next season.		
	From	To.	Miles.	From.	To.	Miles.	From.	To.	Miles.
Central of Georgia:									
Mobile & Girard				Troy, Ala	Andalusia, Ala	50			
Savannah, Macon & Dublin							Ellabell, Ga	Dublin, Ga	
Svannah & Western	Pembroke, Ga	Lyons, Ga	43						
Cerdan Valley	City of Mexico	San Angel, Mex	7						
Chambersburg & Gettysburg				Conococheague, Pa	Caledonia, Pa	6	Caledonia	Wolf Hill, Pa	6
Charleston, Sumter & Northern			6						
" " "	Bennettsville, S. C.	South	12	End of track	Sumter, S. C	53			
" " "	Eutawville, S. C.	Furguson, S. C	6	Sumter, S. C	Bennettsville, S. C.	63			
Charleston, Wilmington & Norfolk							Norfolk, Va	Charleston, S. C	365
Chattanooga Southern	Near Chatta'ga, Tenn	Near Gadsden, Ala	50	End of track	Gadsden	33			
Chesapeake & Ohio:									
Craig Valley	Stone City, Ky	Stone quarries	9						
" "	Hawk's Nest, W. Va.	Anstead Coal Mines	4						
" "	Cabin Creek, W. Va.		15						
" "	Craig Junc., Va		1	Eagle Rock, Va	New Castle, Va	26	Near Clifton Forge, Va	Warm Springs, Va	25
Chicago & Eastern Illinois							Tuscola, Ill	Shelbyville, Ill	37
Chicago, Kalamazoo & Saginaw							Woodbury, Mich	Saginaw, Mich	60
Chicago, Kansas City & Texas				Smithville, Mo	Gower, Mo	17	Gower	Pattonsburg, Mo	40
Chicago, Milwaukee & St. Paul				Necedah, Wis	Remington, Wis	19			
" " "				Lynn, Wis	North	4			
Chicago & Northern Pacific		At Chicago	4						
Chicago & Northwestern:									
Fremont, Elkhorn & Missouri Val	Hot Springs, S. D.	Buffalo Gap, S. D.	12						
" " "	Whitewood, S. D.	Deadwood, S. D	6						
Chicago, Rock Island & Pacific	South Omaha, Neb.	Lincoln, Neb	54.8						
" " " "	Near El Reno, I. T.	Minco, I. T	15.4						
Chicago, St. Paul & Kansas City									
Leavenworth & St. Joseph	Bee Creek Junc., Mo.	Beverly Junc., Mo	23						
Chicago, St. P., Minn. & Omaha	Randolph, Neb	Bloomfield, Neb	21						
" " " "	Marsfield, Wis	Neillsville, Wis	23						
Chicago & West Michigan	Traverse City, Mich	Manistee Riv., Mich.	46				Traverse City	Petoskey, Mich.	65
" " "	Resort Junc., Mich	Ottawa Beach, Mich.	7.1						
Choctaw Coal & Ry. Co	La Fourche Maline	Wister, I. T	65						
Cincinnati, Wabash & Michigan	Anderson, Ind	Rushville, Ind	40						
Cleveland Belt				Cleveland, O	West Cleveland, O	6			
Columbia, Geneva & Western							Geneva, Ala	Columbia, Ala	50
Columbia, Newberry & Laurens	Columbia, S. C.	Jalapa, S. C	50	Japala	Clinton, S. C	15			
Columbus, Shawnee & Hocking	Saltillo, O	Sayre's Station, O	11.1						
Zanesville Belt				C. & E. Junction, O	Zanesville, O	4			
Columbus Southern	Weston, Ga	Albany, Ga	47						
Cooperstown & Charlotte Valley				West Davenport, N.Y	Davenport Cent. N.Y.	3	Davenport, N. Y	Catskill, N. Y.	55
" " "							Cooperstown, N. Y.	Richfield, N. Y.	10
Coos Bay, Roseburg & Eastern				Marshfield, Or	Myrtle Point, Or	25	Myrtle Point	Roseburg, Or	72
Cornwallis Valley	Kentville, N. S	Kingsport, N. S	15				Centreville, N. S	Middleton, N. S	33
Corpus Christi & South America				Corpus Christi, Tex	Brownsville, Tex	160			
Coudersport & Pine Creek	Coudersport, Pa	Sweden Valley, Pa	5				Sweden Valley	Ansonia, Pa	25
Danville & East Tennessee							Danville, Va	Bristol, Tenn	165
Darien Short Line	Belleville, Ga	Northwest	2	Belleville, Ga	Josselyn, Ga	30			
Deadwood Central			10	Gold Run, S. D	Bald Mountain, S. D.	10	Deadwood, S. D	Smelton, S. D	1
Delaware, Lackawanna & West—									
Passaic & Delaware	Bernardsville, N. J.	Gladstone, N. J.	7.4						
Delaware River & Lancaster	St. Peters, Pa	French Creek Jc., Pa.	12	Springfield, Pa	Lancaster, Pa	30			
Delaware, Susque. & Schuylkill				Hazleton, Pa	Oneida, Pa	10			
Denison, Bonham & New Orleans				*Denison, Tex	Bonham, Tex	28			
Denver Resort							Denver, Col	Lookout Mt., Col	14
Denver & Rio Grande	Florence, Col	W. F. Co's mines, Col.	4.6						
" " "	Villa Grove, Col	Alamosa, Col	54						
Drummond County	Drummondville, P. Q.	St. Rosalie, P. Que	27				Carmel, P. Que	Arthabaskaville, P.Q.	23
Duluth, Crookston & Northern	Crookston, Minn.	Crowell, Minn	18						
Duluth, Pierre & Black Hills				Aberdeen, S. D	Faulkton, S. D	44	Oakes, N. D	Pierre, S. D	138
Duluth, South Shore & Atlantic				Bay Mills Sta., Mich.	Bay Mills, Mich	2			
Duluth Transfer	Near Duluth, Minn		3				Bay of St. Louis	At Duluth	20
Duluth & Winnipeg	Grand Rapids, Minn.	White O. Point, Minn	11	White Oak Point	Winnipeg, Man	230			
Dunderburg Spiral				*Jones Point, N. Y	Dunderburg Mt., N.Y.	13			
Dutchess County				*Poughkeepsie, N. Y.	Hopewell Jc., N. Y.	12			
Easton & Northern	Easton, Pa	Belfast Station, Pa.	8					At Easton, Pa	2
East Shore Terminal		At Charleston, S. C.	1.5					At Charleston	1
East Tennessee, Virginia & Ga—									
Briarf'd, Blocton & Birmingham	Birmingham Junc	Blocton, Ala	31						
" " "	Gurnee, Ala	Bessemer, Ala	20						
Johnson City & Carolina				Johnson City, Tenn	Embreeville, Tenn.	16			
Egypt	Egypt, N. C	Sanford, N. C	9						
Ellwood Short Line	North Sewickley, Pa.	Rockpoint, Pa	3.5						
Elmira, Cortland & Northern—									
Camden, Watertown & North							Camden, N. Y	Watertown, N. Y	60
Escambia	Sullivan, Ala	Monroeville, Ala	17						
Escanaba, Iron Mt. & Western	Iron Mountain, Mich.	Escanaba, Mich	53	Iron Mountain	Florence, Wis	14			
Evansville & Terre Haute	Hymera, Ind	Jackson Hill, Ind.	3.8						
Evansville & Richmond	Sand Creek, Ind	Westport, Ind	19						
Fairhaven & Southern	Sedro, Wash.	Coal mines	8				Ferndale, Wash	Lynden, Wash	8
" "	Fairhaven, Wash.	Blaine, Wash.	24				Sedro, Wash	Sauk, Wash	30
" "							Sedro	Seattle, Wash	50
New Westminster Southern	Blaine, Wash	N. Westminster, B. C.	23.5						
Farmville & Powhatan	Sunny Side, Va	Farmville, Va	24				Cumberland C. H.	Appomattox C. H., Va	50
Fidalgo City & Anacortes	Fidalgo City, Wash	Anacortes, Wash	11						
Findlay Belt					At Findlay, O	6			
Findlay, Ft. Wayne & Western				Findlay, O	Fort Wayne, Ind	56			
Flint & Pere Marquette							Novi, Mich	Detroit, Mich	24
Florence Northern							Florence, Ala	Linden, Tenn	76
Florida Central & Peninsula	Plant City, Fla	Tampa, Fla	22.5						
Florida Midland	Harpersville, Fla.	Kissimmee, Fla	15						
Florida Midland & Georgia				Valdosta, Ga	Madison, Fla	29	Madison	Deadman's Bay, Fla	60
Forest City & Sioux City	Gettysburg, S. D.	Forest City, S. D.	17				Forest City	Omaha, Neb	45
Fort Payne & Eastern	Fort Payne, Ala	East	8						
Fort Smith, Paris & Dardanelle							Fort Smith, Ark	Dardanelle, Ark	80
Fort Worth & Rio Grande	Dublin, Tex	Comanche, Tex	22				Comanche, Tex	Llano, Tex	94
Fountain Head	Knoxville, Tenn.	Fountain Head, Tenn.	5.5						
Franklin & Tilton	Near Franklin, N. H.	Tilton, N. H	4						
Gadsden & Attalla Union	Gadsden, Ala	Attalla, Ala	6	Alabama City, Ala	Bl'k Creek Falls, Ala.	4			
" " "				Black Creek Falls	Belleview Hotel, Ala.				
Genesis & Obed River				Crossville, Tenn	Brown's Coal Bank	5		Spring City, Tenn	17
Georges Valley							Union, Me	Warren, Me	8
Georgetown & Appling							Harlem, Ga	Appling, Ga	10
Georgetown & Granger							Granger, Tex	Georgetown, Tex	15
Georgia, Midland & Gulf		At Columbus, Ga	2.3				McDonough, Ga	Atlanta, Ga	28
Georgia Southern & Florida				Tifton, Ga	Thomasville, Ga	52			
Macon & Atlantic				Macon, Ga	Colleton, S. C	183			
Macon & Birmingham	Macon, Ga	La Grange, Ga	97	La Grange	Birmingham, Ala	133			
Georgia, Tennessee & Illinois							Tallapoosa, Ga	Stevenson, Ala	125
Goderich & Pacific							Goderich, Ont	Wingham, Ont	23
Goodyear, Neillsville & Northern	Goodyear, Wis	End of track	5	Saddle Mound, Wis	Tremont, Wis	2	Tremont	Neillsville, Wis	35
" "	Goodyear	McKenna, Wis	2						
Grafton & Upton	Hopedale, Mass	Milford, Mass	1.5						
Grand Rapids & Indiana	Jennings Junc., Mich	Lake City, Mich	6.9						
Grand Trunk							Blackwood, Ont	Near Pt. Edward, Ont	5
"							Kingscourt, Ont	Glencoe, Ont	22
Waterloo Junction				Waterloo, Ont	Elmira, Ont	90			
Great Falls & Canada	Great Falls, Mont	Sweet Grass Hills, Mt	134				Lethbridge	Crow's Nest Pass	75
"	Sweet Grass Hills	Lethbridge, Alberta	70						
Great Northern Line	Pacific Junc., Mont.	West	121	End of track	Seattle, Wash	100			
" "	Grafton, N. Dak	Cavalier, N. Dak	32						
Montana Central	Beulah, Mont.	Monarch, Mont	31						
Seattle & Montana				Seattle, Wash	Skagit River	77			
Great Northwest Central	Brandon, Man	Oak River, Man	50						
Greenfield & Northern	S. Greenfield, Mo	South	10						
Gunpowder Valley				Hoffman, Md	Rockdale, Md	5			
Haines' Hamilton & Kingston	Hamilton, Mo	Kingston, Mo	9						
Harold	Brewton, Ala	Harold, Ala	5						
Harriman Belt	At Harriman, Tenn		3				Harriman	Brushy Mt	12
"							Harriman	Kingston, Tenn	8
Herkimer, Newport & Poland							Poland, N. Y	North	33
Houston Belt								At Houston, Tex	15
Houston & Texas Central	Hutchins, Tex	Lancaster, Tex	5						
Huntington & Big Sandy				Huntington, W. Va	Kenova, W. Va	12			
Huron, Chamberlain & Black Hills							Huron, S. D	Chamberlain, S. D	78
Hutchinson & Southern—									
Omaha, Hutchinson & Gulf	Kingman, Kan	Kan. State line	50						
Indianapolis, Decatur & Quincy							Decatur, Ill	Beardstown, Ill	80
Inter Oceanic	Perote, Mex	Jalapa, Mex	50	Pueblo, Mex	Chiautla, Mex	33			
" "	Vera Cruz, Mex	Las Vegas, Mex	40						
Irondale, Bancroft & Ottawa	G. T. Junc	Irondale, Ont	10	Irondale	Pine Lake, Ont	10	Bancroft, Ont	Irondale	40
Jacksonville Southeastern Line	Litchfield, Ill	E. St. Louis, Ill	49						
Jacksonville & Medford				Jacksonville, Or	Medford, Or	3			
Kanawha & Michigan	Near Malden, W. Va.	South	1						
Kansas City, Ark. & New Orleans				Hazen, Ark	Stuttgart, Ark	22			
Kansas City Link							Quindaro, Mo	Kansas City, Mo	27
Kansas City, Louisiana & Gulf							Arcadia, La	Boyce, La	87
Kan. City, Nevada & Fort Smith	Grand View, Mo	South	14	End of track	Amoret, Mo	36			

NEW RAILROAD CONSTRUCTION—JANUARY 1, 1890, TO JANUARY 1, 1891—Continued.

NAME OF ROAD.	Track laid between Jan. 1 and Dec. 31.			Under contract or construction.			Projected for next season.		
	From.	To.	Miles.	From.	To.	Miles.	From.	To.	Miles.
Kansas City Suburban Belt	Kansas City, Mo.	Blue River, Mo.	5.7	Blue River	Brush Creek, Mo.	6	Brush Creek	Kaw River	10
Kansas City, Watkins & Gulf	Lake Charles, La.	North	17	End of track	Alexandria, La.	80	Alexandria	North	50
Kearney & Black Hills	Kearney, Neb.	Callaway, Neb.	66				Callaway	Gandy, Neb.	42
Kennbec Central	Randolph, Me.	National Home, Me.	5	National Home	South China Me.	11			
Kentucky & Cumberland							Frankfort, Ky.	Sparta, Tenn.	140
Kentucky & Indiana Bridge—									
New Albany Belt & Terminal Co		At New Albany, Ind.	2		At N. Albany	1			
Kentucky Union	Lexington, Ky.	Winchester, Ky.	20				Jackson	East	15
"	Kentucky River	Jackson, Ky.	25						
Kinnickinnick				Kinnickinnick, Ky	Mines	8			
Lackawanna & Montrose							Montrose, Pa.	Alford, Pa	12
Lake Erie, Essex & Detroit River	Near Marshfield, Ont	Calchester Mills, Ont.	4.3				Leamington, Ont.	Blenheim, Ont	35
Lake Shore & Michigan Southern—									
Silver Creek & Dunkirk							Silver, N. Y.	Dunkirk, N. Y.	8
Lancaster & Hamden	Lancaster, O.	South	8	End of track	Wellston, O.	30			
Lancaster, Oxford & Southern							Quarryville, Pa.	White Rock, Pa	8
" " "							Oxford, Pa.	Singerly, Md.	14
" " "							Oxford, Pa.	Landenburg, Md	14
Lehigh & Hudson River—									
Orange County	Burnside, N. Y.	Maybrook Junc., N.Y.	1.3						
Lehigh Valley—									
Buffalo & Geneva				Buffalo, N. Y.	Geneva, N. Y.	98			
Geneva & Van Ettenville				Ovid, N. Y.	Odessa, N.Y.	30			
Schuylkill & Lehigh Valley	Lizard Creek Junc.	Blackwood, Pa.	39.5						
Roselle & South Plainfield	So. Plainfield, N. J.	Roselle, N. J.	10						
Litchfield, Carrollton & Western							Columbiana, Ill	Quincy, Ill.	60
Little Book Cliff	Grand Junction, Col.	Book Cliffs, Col.	12						
Los Angeles Terminal—									
Los, Angeles Pasadena & Glendale	Los Angeles, Cal.	So. Pasadena, Cal.	7.5	Los Angeles	San Pedro, Cal.	20			
Louisiana, Arkansas & Missouri	Trippe Junc., Ark.	Amburn's, Ark.	5.5				Amburn's	Bryan City, La	120
Louis., Evans. & St. Louis Con—									
Belleville, Centralia & Eastern	Centralia, Ill	Belleville Junc., Ill.	48.7						
Louisville & Nashville—									
Birmingham Mineral	Cumberland, Gap.	Norton, Va.	25	End of track	Norton, Va.				
" "	Red Gap, Ala.	Graces, Ala.	10.1						
" "	Milldale, Ala.	Broodwood, Ala.	5.6						
" "	Tacoa, Ala.	Gurnee, Ala.	10						
				Allens, Tenn.	Contrary Pond, Tenn	32			
Louisville, New Albany & Chicago—									
Ft. Wayne, Terre H. & S. W.				Bainbridge, Ind.	Brazil, Ind.	20			
Louisville, New Orleans & Texas	Clarksdale, Miss.	Minter City, Miss.	39.6						
Louisville, St. Louis & Texas—									
L'ville, Hardensb. & Western	End of track	Fordsville, Ky.	17						
" "	Rock Vale, Ky.	Falls of Rough, Ky.	5						
Louisville & Southeastern							Louisville, Ky.	Mt. Washington, Ky.	20
Louisville Southern—									
Richmond, Nicholasv., Ir. & B.	Versailles, Ky.	Richmond, Ky.	38.5	Richmond, Ky.	Beattyville, Ky.	58	Beattyville	Middlesborough, Ky.	100
Lynchburgh & Durham	South Boston, Va.	Durham, N. C.	51.1						
Lynchburg Belt								At Lynchburg, Va.	8
Lower Laurentian	St. Tite, Que.	Rivière a Pierre, Que.	20	Three Rivers, P. Que.	Piles, P. Q.	20			
Macon & Dublin	Macon, Ga.	Dry Branch, Ga.	10	Macon, Ga.	Dublin, Ga.	55	Dublin	Savannah, Ga.	105
Mahoning Valley							Punxsutawney, Pa.	Clearfield, Pa.	42
Maine Central—									
Coos Valley	North Stratford, N.H.	Quebec Junc., N. H.	32.4						
Manistee & Grand Rapids	Oak Park, Mich.	Sable River, Mich.	9.8	Sable River	Lake Co. line, Mich.	9	Lake County line	Grand Rapids, Mich.	87
" "	Round House	Filer City, Mich.	1.5	Oak Park	Manistee River, Mich.	5			
Manistee & Northeastern	Nessen City, Mich.	Interlochen, Mich.	11.7	Interlochen	Lake Ann, Mich.	7	Lake Ann	Traverse City, Mich.	19
Manitoba & Northwestern	Saltcoats, Assn.	Yorkton, Assn.	17.2						
Manitou & Pike's Peak	Manitou, Col.	Pike's Peak, Col.	9						
Marietta & North Georgia—									
Knoxville Southern	Negro Creek, Tenn.	Knoxville, Tenn.	95						
Mary Lee Coal & Railway Co.	Lewisburg, Ala.	Coal mines	2						
Massawippa Junction				Coaticook	Ayers Flat	15			
Mexican	Pachucah, Mex.	End of track	12						
Mexican Central				Tula, Mex	Pachucah, Tex.	45			
Mexican International	Hornos, Mex.	San Pedro, Mex.	14.5						
Mexican Northern	Escalon, Mex	Coahuila, Mex.	60	End of track	Sierra Mojada, Mex.	22			
Mexican Pacific	Tonala, Mex.	South	20	End of track	Tuxtla Guiterez, Mex	33	Tonala, Me	Frontera, Mex.	400
Mexican Southern	Puebla, Mex.	Tepeaca, Mex.	25	Tepeaca	Tehuacan, Mex.	53	Tehuacan	Oajaca, Mex	220
Middleb., Highland & L. Butler	Highland, Fla.		10						
Middle & East Tennessee Central	Roganna, Tenn.	Hartsville, Tenn.	20						
Middle Georgia & Atlantic	Eatonton, Ga.	Covington, Ga.	45				Atlanta, Ga.	Savannah, Ga	171
" "	Newbury, Ga.	Social Circle, Ga.	12						
Middlesborough Belt		At Middlesb., Ky.	18						
Millen & Southern	Thrift, Ga.	Millen, Ga.	10.5				Millen	Savannah River	30
Milwaukee, Lake Shore & Western				Wausau, Wis.	Marshfield, Wis.	40			
Milwaukee, Menominee Falls & W.	Wisconsin Cen. R. R.	Sussex, Wis.	1.5				Sussex	Jeneau, Wis.	38
Minneap., St. P'l & Sault Ste Marie							Boynton, N. D.	Coteaus	12
" "							Hankinson, N. D.	Jamestown, N. D.	105
Minnesota & Southeastern	Branch		2						
Mississippi & Little Rock	Aurich, Ark.	West	6.5	Duncan, Ark.	Little Rock, Ark.	61			
Mississippi River & Bonne Terre	Herculaneum, Mo	River Side	2						
Missiouri, Kansas & Texas—									
Sherman, Denison & Dallas	Denison, Tex.	Sherman, Tex.	9.5						
Dallas & Waco				Waxahachie, Tex	Hillsboro, Tex.	35			
Wichita Valley	Wichita Falls, Tex.	Seymour, Tex.	51						
Missouri River, No. Platte & Den.							Albion, Neb.	Wallace, Neb.	214
Missouri Pacific	Fort Scott, Kan.	Minden Junc.	25.3						
" "		At Boonville, Mo.	1.						
" "	Joplin, Mo.	Southwest	2.5						
" "		At Carthage, Mo.	1.						
Ft. Scott Belt		At Fort Scott, Kan.	4.8						
Ft. Scott & Eastern	Fort Scott, Kan.	Rich Hill, Mo.	26.3						
Houston, Central Arkansas & No	McGehee, Ark.	Mer Rouge, La.	46.7	Riverton, La.	Alexandria, La.	75			
Kansas & Arkansas Valley	Cherokee Junc., I. T.	South	4.9						
" "	Union, Neb.	Gilmore, Neb.	25						
Mobile, Jackson & Kansas City							Mobile, Ala.	Jackson, Miss.	183
Montgomery, Tus & Memphis	Montgomery, Ala.	West	.5	Montgomery	Tuscaloosa, Ala.	106	Tuscaloosa	Artesia, Miss.	150
Montreal & Ottawa	Hudson, Ont.	Rigaud, Ont.	8						
Montreal & Western	Ste. Jerome, P. Que.	Worth	10				End of track	Le Desert, Que.	60
Monterey & Mexican Gulf	Montemorelos, Mex.	End of track	235	End of track	Tampico, Mex.	84			
Morristown & Cumberland Gap				Morristown, Tenn.	Floyd's Sta., Tenn.	44			
Mount Auburn & Taylorville							Mount Auburn, Ill.	Taylorville, Ill.	18
Mount Jewett, Kinzua & Riterv.				Camp Halsey, Pa.	Tallyho, Pa.	5	Tallyho	Kinzua Forks, Pa.	9
" "				Kushequa, Pa.	Gaffney's, Pa.	.5			
Nashville, Chattanooga & St. Louis	Littleton, Ala.	T'ward Guntersv. Ala	19	End of track	Guntersville	4	Guntersville	Bell Factory, Ala	42
" "	Dunlap, Tenn.	Pikeville, Tenn.	20						
Nashville & Knoxville	Buffalo Valley, Tenn.	Cookville, Tenn.	22				Cookeville	East	18
Nashville & Missippi Delta							Okolona, Miss.	Grenada, Miss.	60
Nevada, California, Oregon	Diegan, Cal.	Amedee, Cal.	10				Amedee, Cal.	Columbia River	13
New Orl., Ft. Jack. & Grand Isle	Gretna, La.	Socola, La.	35	Socola	Buras, La.	20			
New Orleans & Northwestern	Sycamore, La.	Rayville, La.	66	Rayville	Bastrop, La.	24	Bastrop	Little Rock, Ark.	
" "	Magnolia, Miss.	Natchez, Miss.	3						
Newport & Sherman's Valley	Newport, Pa.	Loysville, Pa.	16	Loysville	New Germantown, Pa	15			
New York Central & Hudson River							Utica, N. Y.	Clayton, N. Y.	90
Niagara Falls & La Salle							La Salle, N. Y.	Niagara Falls, N. Y.	6
New York, Ontario & Western—									
Ontario, Carbondale & Scranton	Hancock Junc., N. Y.	Scranton, Pa.	54.4						
Norfolk & Western	Honaker, Va.	End of track	41						
" "	Ivanhoe, Va.	Gossan, Va.	15.4	Ivanhoe	Crozer Mines, Va.				
" "	Hasher, Va.	Coal Mines, Va.	4.2	Virginia City, Va.	Coal Mines, Va.	1.3			
" "	Near Doran, Va.	Coal Mines, Va.	1.2						
West Virginia & Ironton				Elkhorn, W. Va.	Ironton, O.	192			
Northern Pacific—									
" "	Crookston, Minn.	Carthage, Minn.	22.1						
" "	Logan, Mont.	Butte, Mont	13.1						
" "	Sappington, Mont.	Norris, Mont.	70.8						
" "	Harrison, Mont.	Pony, Mont	7						
" "	Boulder, Mont.	Elkton, Mont	8.7						
" "	Desmett, Mont.	St. Regis, Mont.	93.6						
" "	Mullan, Id.	St. Regis, Ida.	11.1						
" "	Cheney, Wash.	Coulee City, Wash.	21	Coulee, Wash.	Summit	12			
" "	Belmont, Wash.	Farmington, Wash.	6.1						
" "	Pullman, Wash.	Volmar, Id	22.7	Volmar, Id.	Lewiston, Id	49			
" "	Burnett, Wash.	Pittsburgh, Wash.	2.2						
" "	Hunters, Or.	Globe, Or	2						
" "	Black River, Wash.	Cedar River, Wash.	2.5	Cedar River, Wash.	Seattle	20.3			
" "	Lakeview, Wash.	Olympia, Wash	21.7	Olympia	Harlowe	10			
" "	Centralia, Wash.	Montesano, Wash.	41.8	Montesano	Ocosta, Wash.	10			
" "	Dunham, Wash	Williams Creek	7.5	Williams Creek	Nidlocks	10			
" "	Great Bend, N. D.	Keystone, N. D.	6						
Nova Scotia Central							Middleton, N. S.	Margaretville, N. S.	9
Ogden & Hot Springs	Ogden, Utah	Hot Springs, Utah.	10				End of track	Piedmont, Ala.	12
Ohatchie Valley	Laney, Ala.	Ore Mines	5						
Ohio & Mississippi—									
Cincinnati & Bedford	Riverdale, Ind.	Bedford, Ind	6.5						
" "		Rock Creek quarries,	2.5						
Old Colony	No. Attleboro, Mass.	Walpole, Mass.	12 9	Walpole	Norwood, Mass.	4			

NEW RAILROAD CONSTRUCTION—JANUARY 1, 1890, TO JANUARY 1, 1891—Continued.

NAME OF ROAD.	Track laid between Jan. 1 and Dec. 31.			Under contract or construction.			Proposed for next season.		
	From.	To.	Miles.	From.	To.	Miles.	From.	To.	Miles.
Oregon Improvement Co.—									
Seattle & Northern	Anacortes, Wash.	Hamilton, W.	37						
Port Townsend Southern	Port Townsend, Wash	Lake Hooker, Wash.	20	Lake Hooker	Quilcene, Wash		Port Townsend	Olympia, Wash	
Oregonian				Coburg, Or.	Springfield, Or.	13	East Portland, Or.	Silverton, Or.	50
Oregon & Washington & Territory				Centralia, Wash.	Gray's Harbor, Wash	60	Hunts Junc., Wash.	Portland, Or.	220
Orlando & Winter Park—									
Osceola & Lake Jessup	Osceola, Fla	Oviedo, Fla	9.8						
Ottawa & Parry Sound							Ottawa, Ont	Parry Sound, Ont.	138
Owensboro, F'ls of R'gh & Gr'n River	Fair Grounds, Ky	Owensboro, Ky.	5						24
Ottawa & Gatineau Valley	Gatineau Junc., Ont.	Peche, Ont	20	Peche	North, Ont	10			
Pacific Short Line	Sioux City, Neb	O'Neill, Neb.	129						
Paducah, Tennessee & Alabama	Paducah, Ky.	Tenn. State Line	49	End of track	Paris, Tenn.	15	Paris	Florence, Ala.	210
Palatka & Lake Shore							Apopka, Fla.	Palatka, Fla.	83
Pecos Valley	Pecos City, Tex.	Eddy, N. M.	90				Eddy, N. M.	Roswell, N. M.	90
Pennsylvania	Pencoyd Ir'n W'k's, Pa		1.3						
"	New Lisbon, N. J.	Brown's Mills, N. J.	1.8						
Downington & Lancaster	New Holland, Pa.	Near Lancaster, Pa.	9.8						
Southwest Pennsylvania	Junc. Radabaugh br.		7.7						
Tyrone & Clearfield	Ednie Junc. Pa.		0.3						
" "	Hendrick Junc., Pa.		0.7						
" "	Banion Junc., Pa.		2.2						
West Pennsylvania	Junc. Butler ext.		8.3						
Ohio Connecting	Verner Station, Pa.	Near Nimick, Pa.	2.5						
Pittsburgh, Ohio Valley & Cin.	Putney, O.	Wegee, O.	3	Bellaire, O.	Powhatan, O.	16			
Waverly & New York Bay				Waverly, N. J.	New York Bay	6			
Perry County							New Bloomfield, Pa.	Loysville, Pa.	12
Philadelphia Belt Line							At Philadelphia, Pa		25
Philadelphia & Reading—									
Middletown & Hummelstown	Middletown, Pa.	Hummelstown, Pa.	9						
Northeast Pennsylvania	Hartsville, Pa.	New Hope, Pa.	16						
Brigantine Beach	Grassy Bay, N. J.	Brig'ntine Be'ch, N.J.	5.5						
Phila., Harrisburg & Pittsburgh				Bowmansdale, Pa.	Harrisburg, Pa.	9			
Camden County	Mt. Ephraim, N. J.	Little Timber Crk, N.J.	5	Little Timber Creek	Spring Mills, N. J.	8			
Port Reading							Somerset Co., N. J.	Arthur Kill, N. J.	20
Philadelphia & Sea Shore	Winslow Junction	Tuckahoe, N. J.	27	Tuckahoe, N. J.	Sea Isle City, N. J.	10			
				" "	Cape May, N. J.	28			
Phillips & Rangely	Phillips, Me.	Rangely, Me.	28.3						
Pittsburgh, Akron & Western	Carey, O.	Rocky River	88	Rocky River	Akron, O.	19			
Pittsburgh, Shenango & Lake Erie	Greenville, Pa.	Hartstown, Pa.	10						
Pittsford & Rutland	Center Rutland, Vt	Rutland, Vt.	2						
Plymouth & Bourndale							Plymouth, Mass	Bourndale, Mass.	16
Plymouth & Middleboro							" "	Middleboro, Mass.	18
Port Arthur, Duluth & Western	Stanley, Ont.	Bey'd Whitefish L'ke	50	End of track	Inter. line	20	Inter. line	Ely Minn.	25
Port Clinton Short Line				Port Clinton, O.	Short Line Junc.	12	Fremont, O.	Tiffin, O.	18
" " "							Port Clinton	Marblehead, O.	12
Port Edward, Centralia & Northern	Port Edwards, Wis.	Marshfield, Wis	30				Port Edwards	Nekoosa, Wis	3
Portland & Rumford Falls							Gilbertville, Me.	Rumford Falls, Me.	15
Quebec Central							Tring, P. Q.	Lake Megantic, P.Q.	52
Raritan River	Sayerville Junc., N.J.	Sayerville, N. J.	2	New Brunswick, N.J.	Bound Brook, N. J.	7			
Reading & Southwestern							Reading, Pa.	Mohnsville, Pa.	5
Red Lake & Western							St. Halaw, Man.	Red Lake River, Man.	23
Richmond & Chesapeake							Richmond, Va.	Potomac River	67
Richmond & Danville	Andrews, N. C.	Tomutola, N. C.	10	Tomotle	Murphy, N. C	5			
Northwestern North Carolina	Siloam, N. C	Wilkesboro, N. C.	42						
Fadkin	Salisbury, N. C.	Bilesville, N. C.	24	Bilesville	Norwood, N. C.	17			
Georgia Pacific	Itta Bena, Miss.	Webb's, Miss.	34				Webb's	Yazoo City, Miss.	45
"	N. Birmingham, Ala.	Coalburg, Ala.	8				Clarksdale	Helena, Ark.	40
Richmond, Fred'ksburg & Potomac	Acca, Va.	James River, Va.	3						
Richmond & Petersburg	Cloyston, Va.	" "	4						
Richmond & Tidewater				Rich. & Danv. R. R.	Tomah'wk Ch'ch, Va.	5			
Rio Grande Junction	Rifle Creek, Col.	Grand Junc., Col.	63						
Rio Grande Southern	Ridgeway, Col.	Telluride, Col.	46	Telluride	Durango	121			
" "	Durango, Col.	Coal Banks, Col.	5						
Rio Grande Western	Utah State Line	Crevasse, Col.	16						
" "	Thistle, Utah	Manti, Utah.	60				Manti	Marysvale, Utah.	72
Ritch Patch Iron Co.	Mines, Va.	C. & O. R. R.	4						
Roanoke & Southern	Walnut Cove, N. C.	Martinsville, Va.	43	Martinsville	Roanoke, Va	60			
Rochester, Beaver Falls & Western		At Beaver Falls, Pa.	1.5						
Rockaway Valley				Peapack, N. J.	Mendham, N. J.	6			
Rockport, Lanadon & Northern	Rockport, Mo.	Langdon, Mo.	7						
St. Augustine & North Beach	N. Beach Junc., Fla.	North Beach, Fla.	3						
St. Joseph's Valley							Berrien Springs, Mich	Benton Harbor, Mich	20
St. Louis & Eastern	Venice, Ill.	Coal Mines.	12						
St. Louis, Kennett & Southern	Campbell, Mo.	Kennett, Mo.	18.5						140
St. Louis & Superior							Superior, Wis.	Duluth, Minn.	20
San Antonio & Aransas Pass	Evergreen, Tex.	Lexington, Tex.	12						
Sault Ste. Marie & Southwestern	Eleva, Wis.	Mondovi, Wis.	10				Mondovi, Wis.	Alma, Wis.	20
Savannah, Americus & Montgomery	Helena, Ga.	Lyons, Ga.	40						
" "	Louvale, Ga.	Near Hurtsboro, Ala.	25	End of track	Montgomery, Ala.	70			55
Seaboard & Roanoke—									
Ga. Carolina & North	Chester, S. C.	Savannah River	110	Savannah River	Athens, Ga	45	Athens	Atlanta, Ga.	
Seattle, Lake Shore & Eastern	24 miles north of Snohomish, Wash.	North Skagit River	62	End of track	Interboundary	16			
Silverton							Silverton, Col	Eureka, Col.	8
Somerset	Solon, Me.	Bingham, Me.	8						
South Atlantic & Ohio	Natural Tunnel, Va.	Big Stone Gap, Va.	21.5						
South Bound	Savannah, Ga.	North	10	End of track	Columbia, S. C.	142			
Southern Pacific	Oakdale, Cal.	Merced, Cal.	39.3	Avon, Cal.	San Ramon, Cal.	21			
" "	Los Banos, Cal.	Firebaughs, Cal.	30.	Firebaughs	Armona, Cal.	58			
				Near Comstock, Tex.	Shumla, Tex.	13			
South Sioux Falls Terminal							Sioux Falls, S. D.	Wyoming State Line	
Spokane Falls & Northern	Colville, Wash.	Little Dalles, Wash.	31.5						
Stuttgart & Arkansas River	Stuttgart, Ark.	DeWitt, Ark.	25	DeWitt	Pendleton, Ark.	21			
Suwannee River	Bald Hill, Fla.	Hattyburg, Fla.	12						
Tacoma Eastern				Com'menc. Bay, Wash	South	6			
Temiscouta	Edmundston, N. B.	Clairs, N. B.	20	Clairs	St. Francis R'v'r, N. B	16			
Tenn. River, Ashville & Chattan'ga	Ashville, Ala.	Whitney, Ala.	3	Ashville, Ala.	Ashville				Tennessee R. 100
Terminal City									Terminal City, N. S 6
Terre Haute & Miss. River							Mulgrave, N. S	Terre Haute, Ind.	Chester, Ind. 135
Texarkana & Ft. Smith				Red River, Tex.	North	15			
Texakana & Shreveport	Near Roberts, Ark.	Lynn, Ark.	8				Lynn	Shreveport, La.	46
Tobique Valley	At Andover, N. B.		2	End of track	Plaster Rock, N. B	14			
Toledo & Ohio Central Extension	Amesville, O.	Newton, O.	8						
Trout Run	Snyders, Pa.	Pump Sta., Pa.	4.5						
Union Pacific	La Grande, Or.	Elgin, Or	20.9	*Portland, Or	Seattle, Wash	185			
" "	Wallace, Idaho.	Burke, Idaho.	6.4						
" "	Wallace, Idaho.	Mullan, Idaho.	6.7						
" "	Ogden, Utah.	McCammon, Idaho.	22 6						
" "	Milford, Utah.	Urton, Utah.	7.7	*Urton	Pioche, Nev	137			
" "	Martinsen, Col.	Red River, N. M.	29						
" "	Road Junc., Col.	Berwind, Col.	2.8						
" "	Poole, Neb.	Pleasonton, Neb.	3.5						
" "	Wendover, Wyo.	Orin Junc., Wyo.	31.4						
Fort Worth & Denver City	Hodge, Tex.	Fort Worth, Tex.	5.5						
Utah Central	Salt Lake, Utah.	Monahansett Beach	10	Park City, Utah	Provo River, Utah	25			
" "				" "	Heber City, Utah	8			
" "				" "	Weber Cañon, Utah	20			
Vancouver, Klickitat & Yakima	Salmon Creek, Wash.		4	End of track	Lewis River, Wash.	12			
Vanegas, Cedral & Rio Verde	Cedral, Mex.	Matchuala, Mex	22						
" " " " "	Cedral Junc., Mex.	Pachon, Mex.	12	Pachon,	Potners, Mex.	8			
Wabash—									
Peru & Detroit	Peru, Ind.	Chili, Ind.	9.6				Montpelier, Ind.	Hammond, Ind.	135
Waco, Lampasas & Llano				Lampasas, Tex.	Alano, Tex.	41	Waco, Tex.	Lampasas	111
Wadena & Park Rapids				Wadena, Minn.	Park Rapids, Minn.	36			
" " " "				Wadena	Eagle Bend, Minn.	19			
Wantauga Valley				Carters, Tenn.	Wautauga P't, Tenn.	5			
Weatherf'd, Mineral Wells & N'w'n.	Weatherford, Tex.	Mineral Wells, Tex.	21.8						
West End Connecting				West End, N. J.	Bergen P't, N. J.	7			
Westerly & Jewett City							Westerley, R. I.	Lisbon, Conn.	25
Western Counties	Digby, N. S.	Annapolis, N. S	20						
" "							Arlington Sta., Md.	Colgate Creek	10
Western Maryland							Williamsport, Md.	Cherry Run, Md.	12
West Virginia Central & Pittsburgh				Elkins, W. Va	Beverley, W. Va.	7			
" " " " "				Elkins	Bealington, W. Va.	17			
West Virginia & Pittsburgh	Buckhannon	Alton, W. Va.	20	Alton	Pickins, W. Va.	15			
" " " "	Weston	Burnsville, W. Va.	26	Barnsville	Braxton C. H., W. Va	20	Braxton C. H.	Gauley River	25
" " " "	Shinnston, W. Va.	Clarksburg, W. Va.	16						
Wheeling Bridge & Terminal	Terminal system	At Wheeling, W. Va	5.7						
Wheeling & Lake Erie	Steubenville	Portland, O.	14	Portland, O.	Bellaire, O.	12			
Wilkesbarre & Western	Watsontown, Pa.	Toward Forks	10	End of track	Forks, Pa.	22			
Wilmington, Chadbourn & Conway	Chadbourn, N. C.	Northwest	2	End of track	Bee Bluff, N. C.	9			
Wilmington, Onslow & E. Carolina	Wilmington, N. C.	Winona, N. C.	45	Winona	Jacksonville, N. C.	5			
Winona & Southwestern	Utica, Minn.	Spring Valley, Minn.	46	Spring Valley	Osage, Ia.	37			
Wisconsin Midland		At Fon du Lac, Wis.	3						
Woonsocket & Pascoag	Woonsocket, R. I.	Pascoag, R. I.	12						
Wrightsville & Tennille							Dublin, Ga.	Abbeville, Ga.	40
Yemasse & Walterboro							Yemasse, S. C.	Walterboro, S. C.	40

*Work suspended.

Cut-off for new mainline—part of the old main line used as a branch.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The locomotive building by private firms was considerably more in 1890 than in 1889. In 1889 16 firms built 1,860 locomotives. In 1890 14 firms built 2,213, and we know that several of those who have not yet reported were very busy through the year. We may therefore conclude that the year's product has been materially greater than that of 1888, when 17 firms built 2,180 locomotives. Eleven of the firms that have reported up to date built over 18 per cent. more engines in 1890 than in 1889. All but two of those firms increased their output, and one of the two is the Grant Locomotive Works, which have been practically at a standstill for a good while. The Baldwin Works lead with 953 locomotives, an increase of 14 per cent. The Schenectady Works were the next largest builders, and their increase in output was over 53 per cent. The average yearly product of 19 firms for eight years, 1881–1888, was 1,645 locomotives. It will be seen that the product of each of the last three years has been far above that average.

The net increase in locomotive equipment for a number of years has been, by Poor's Manual :

1889	1,662	1886	478
1888	1,755	1885	1,350
1887	1,228	Average	1,294

It will be seen, therefore, that all of the locomotives built by the railroad companies, and a large percentage of the product of the private works, are absorbed in filling vacant numbers. Owing to the difficulty of getting full returns from the railroad shops, we are unable now to estimate what the total annual product is and how many engines go to replace those worn out. We hope to be able to make such an estimate in a later issue.

The Board of Direction of the American Society of Civil Engineers has issued a sheet containing eight tickets for officers for 1891. These are as published in our issue of Dec. 5, except that Mr. Katté has declined to run for vice-president. This leaves only three contested offices, viz., *Secretary*, Trautwine *vs.* Collingwood ; *Treasurer*, Boller *vs.* Bogart ; *Director*, Childs *vs.* Brush. Those members who are uncompromisingly in favor of a change in the administration of the Society will vote the names which are here placed first under each office. Those who are satisfied with matters as they are will vote for the other candidates. Ballots must be in by Jan. 21, the date of the annual meeting.

In summing up last July the new railroad construction for the first half of 1890 we said that probably over 6,000 miles of new main line track would be built in the year. We give in this week's issue a detailed table of new construction showing a total of 5,967 miles for the United States and 1,127 miles for Canada and Mexico. These figures are doubtless subject to some slight corrections, but are in the main accurate. For three years the greatest activity in railroad building has been in the Southern States, and it still continues. The following table will show the percentage of the total new railroad built which may be assigned to each group of states and territories:

	1889.	1890.
Southern states east of the Mississippi	36	34
Northern states east of the Mississippi	24	18
Southwestern states	18	18
Northwestern states	10	21
Pacific coast states	12	9

The general characteristic continues to be, as heretofore, the extension of old lines, or building of feeders and branches by existing companies. In our list it will be found that 210 railroads or systems have been engaged in new construction during the year, giving an average of 284 miles for each company. A more careful analysis of the figures will be given in next week's issue, together with some discussion of the relations of the work for the past year to railroad geography.

The Relief of the Elevated Roads of New York.

The elevated railroads of New York have the misfortune to do their work under a stronger light than any other roads in the country. The editors and reporters of the daily papers see and feel personally the discomforts and inconveniences incident to handling the immense business of the system and, being human, they do not neglect their opportunities to let the world know what those discomforts and inconveniences are. Consequently the managers of the elevated get a good deal more criticism than they deserve; and they do not get all the credit they deserve for the ability with which the system is operated. On another page is given an abstract of a letter from Mr. Gould replying to some criticisms of the *New York Tribune*. The figures of passengers carried and of the safety with which they have been carried are familiar but wonderful. The daily average is now about 600,000; up to Dec. 1, 1890, over 1,425 million passengers had been carried, and but one had been killed in the cars and only 51 on the structures of the entire system. For these facts the elevated companies should have credit; and they should also have credit for a great part in the prosperity and growth of the city in the last dozen years.

But we cannot follow Mr. Gould in his suggestions of means of relief from the present overcrowding. He says that, with the new equipment building, the roads will soon be able "to run five-car trains continuously, and add new trains as fast as the traffic demands it," and that, on the other hand, if the city will give them space for certain "slightly improved terminals," they can easily carry 2,000,000 people a day." If they can add new trains "as fast as the traffic demands it." why not do so and drop the terminal matter until the traffic demands more new trains than can be handled? In fact, the traffic has been demanding new trains for several years, and getting some, and still demands more about as loudly as it knows how to. We had not supposed that it was a mere question of equipment, but that trains were got away from the crowded South Ferry terminal in the busy hours as fast as they could be handled there. In fact, Mr. Gould implies this in the letter quoted. He says that the "slightly improved terminals" would enable the system to handle 2,000,000 people a day. Very likely. In fact, they could to-day, with their present equipment, track and terminals, handle between 1,250,000 and 1,500,000 people a day as comfortably as they handle the present movement of 600,000 a day, *if they were uniformily distributed throughout the day.* With better terminal facilities they could doubtless handle 2,000,000 on the same conditions. The maximum travel is between 7 and 8 o'clock a. m. and 5 and 6 o'clock p. m. on the system as a whole. This is true on all the individual lines of the system but the Sixth avenue line, where the morning maximum is an hour later. The greatest movement is in the evening hour. In the month of November, 1890, there were carried, between the hours of 5 and 6 o'clock p. m., 1,639,679 passengers. That would be an average of 54,656 for this hour, including Sundays. But there were five Sundays in the month, so that 60,000 people may safely be taken as the number to be provided for in the busiest hour.

The problem therefore is to move 60,000 people an hour now with comfort, and to provide for a steady increase in that number. This increase is now going on, and would be faster if the accommodations were better. When the people traveling in the most crowded hour are taken care of the daily movement will take care of itself, whether that be 2,000,000 passengers or less. The problem is a tough one, and is not to be solved by simply putting on more rolling stock. Longer trains could be run, or more of them. To run longer trains necessitates longer platforms, and the public will object to these. They necessitate heavier engines, and hence, on some of the lines, stronger structures. To run more trains involves handling them quicker at the terminals and especially at South Ferry. This is a question of more yard room and of parallel tracks from the intersection of the Sixth Avenue and Ninth Avenue tracks to the station. The question of loops is not vital. With room enough to keep the trains of the different lines apart, and to switch the engines, trains could be moved as fast as they could be emptied and filled, and the headway reduced enough to greatly increase the capacity of the system. The loop idea is not favored by all the officers of the road for several good practical reasons, and the relief can be got without occupying the space necessary for loops. How the companies are to get more room we shall not pretend to say, but it is hard to see how they are going to much increase the capacity of the system without it. We are not certain that this involves the invasion of the Battery Park. All trains are not now run to the South Ferry terminus, and probably with larger auxiliary yards both sides of the city, like those at Rector and Franklin streets, enough more trains could be started at the crowded hours to give great relief.

Whatever may be the outcome of all the schemes for rapid transit in New York, it is certain that for some years to come the present elevated roads will furnish all that the citizens can get, and the first relief must come from their improvement, and the only adequate improvement is one that will permit a car movement on the most congested line, at the most crowded hour, equal to a five-car train every minute and a half. How this can be done without bigger terminal yards, perhaps some student of the subject will tell us.

A Step in Freight Car Construction.

One of the most important steps in general freight car construction is that just taken by the Burlington road in lowering the sills of all freight cars to the position generally occupied by the draft timbers. All freight cars on that road, it is expected, will be built in that way hereafter. This construction has two important points of advantage, as well as several minor ones of lesser advantage.

The increased clear height, with the same total height above rail, is about 8 in., which gives the cars a wider range of usefulness; and the superior draft rigging attachments and increased resistance to shocks and blows it is believed will materially decrease the cost of repairs to the superstructure.

This change in construction is the result of experience had in the last few years with a new design of furniture cars with low floors, such as is now commonly seen on Western roads. These cars were constructed with the draft line at the same height as the sills of the cars, the drawbars passing through the end sills. The result of this has been a decreased cost of maintenance of the draft rigging and an almost entire removal of the sagging of the ends of the cars and the consequent dropping of the couplers. It was at first supposed that these low cars would be unpopular owing to possible inconvenience at station platforms, but, to the contrary, freight agents prefer them, and they are loaded or unloaded in all cases as easily as the higher cars, and where the loading is directly upon or from drays the low cars are considerably better. It is found upon examination of the heights of platforms on several Western roads that the height above the rail continually decreases, and that where the height was originally about equal to that of the floor of the freight cars it has now decreased until the car is from 3 to 4 in. higher than the platform. This is caused by the tendency to raise the track whenever it is leveled up by trackmen and by the sinking of the platform. For this reason the new low cars are found to be about 4 or 5 in. lower than the landing stages, instead of 8 or 9 in., as might be supposed. This is not a point of great importance, as an inclined plane is almost invariably used to reach from the landing stage to the floor of the car and a raise of a few inches makes but little difference in handling freight.

The desideratum is to obtain more head room without increasing the height and to procure a stronger construction. Simplicity is always to be sought in car construction, and by this arrangement of the draft rigging between and directly in line with the centre sills

there is a large reduction in the number of parts used for drawbar attachments, and consequently a decreased first cost. The number of pieces removed will vary somewhat with the design, but will average about 20, including bolts and nuts.

It has been argued that it will cost more to remove and replace a broken centre sill than a draft timber. This is true, but it has not been found that the centre sills in this type of car give trouble from breaking, for the sufficiently good reason that they are subjected principally to blows upon their ends, these blows being transmitted directly through one integral piece to the next car, whereas the draft timbers have to resist a transverse breaking strain, and the end blows are transmitted through bolts and inferior key connections to the centre sills, the evil of which has recently been better appreciated, and it is now common to find oak filling pieces of considerable size between the ends of the draft timbers, placed longitudinally under the centre sills. This in reality is a sub-sill without the advantages of such a sill, and its presence is sufficient proof of the lack of security and durability to be had with the draft timbers of the common form.

This is a subject on which we shall have more to say shortly, as we are expecting some statistics from service, and we refer our readers who are interested in the matter to the discussion by Mr. Rhodes and others before the Western Railroad Club at its last meeting, the substance of which appears in this issue.

Colored vs. "White" Lights for All-Clear Signals.

Certain operations in railroading, familiar to all, are regularly carried on under circumstances necessitating considerable risk, and in spite of those circumstances, because the danger has become a familiar one, because it is small, or for other reasons. A familiar example is the use of ordinary instead of colored lights for indicating to an engine runner at night that the track in front of him is clear. Every one knows that a street lamp or a light from some other wrongful source is likely some time to tell an engineman that the track is clear when it is not, but any anxiety felt concerning this danger is so mitigated by the feeling that the danger is remote that not much is heard of it. Still the question receives notice here and there, and it is to call attention to some of its aspects that we now speak of it. One of our best signal engineers recently advocated the use of green for all-clear signals, and a prominent Western road has put in several interlocking plants in which the semaphore arms are so made as to always show a *colored* glass in front of the lamps, green for all clear and red for stop. The Boston & Albany, whose semaphores are fitted with three lamps each, so as to give position signals at night, uses green lights for the all clear position, and has done this for several years, so that the use of green for safety cannot be regarded as an untried experiment.

If the circumstances are correctly given, a derailment on the Chicago & West Michigan, reported in our November accident record, printed last week, must lead the officers of that road to take a lively interest in this question. An officers' car was ditched at a derailing switch, and several of the occupants injured, by reason of the breakage or displacement of a red glass in a signal lamp, whereby the flame appeared to the engineman in its natural color, thus indicating safety, while in fact the position of the signal was danger. A snowstorm was raging at the time. A few more mishaps of this kind would very quickly bring the color question to the front; but the part of wisdom is, of course, to consider all questions according to their intrinsic importance, and not be guided by mere temporary prominence. In addition to the possibility of engineers mistakenly reading an all-right signal from fishermen's lanterns or from lights placed in the window for lovers by romantic maidens, we see here the liability that danger may come from failure of the signals themselves as well as from mistakes of engineers.

The claims and arguments for the use of white are familiar. White is consistent with the day signal for all clear, and that has been used so long and is so satisfactory that no one thinks of changing it. Every one rests on the assumption that there are only two colors available, and that one of these (red) is needed to indicate danger, and the other (green) to indicate caution. During the past few years the most familiar answer to complaints about signal lights has been the argument for the illuminated semaphore, and it is not to be denied that this device has made encouraging progress; but in view of the increased cost of the additional element, in view also of the features in which illuminated blades are still to be perfected, and the inclination of many managers to stick to lamp signals, simply because they are old and well tried, it is certainly well to take all reasonable means to make them satisfactory. There is no ground for assuming that the present plans of using lamps and colored lenses are the most perfect possible.

In the nature of things the possibility of a collision by reason of the breakage of a glass is somewhat remote, for an operator seeing a train pass a signal which he knows is at danger would often have some chance of stopping the train by a hand signal. The engineman would also have, in fair weather, the chance of seeing, by the aid of his headlight, the position of the day signal, whether arm or disc. If an engineer sees a street lamp (or any other white light) and in consequence runs past a signal which actually shows a red light against him he will, in many cases, be found to have neglected precautions that were plainly necessary, and it is therefore fair to put the blame wholly upon him; but this does not fully answer the excuse that he can fairly make when a street lamp takes the place, in his vision, of a switch or block signal lamp which has become suddenly extinguished by accidental causes, and in any event the true desideratum is a system which shall not only work well practically, but be satisfactory theoretically. In signal lights, as in train dispatching rules, construction of locomotives and numerous other things, all intelligent officers strive after a correct system; not necessarily to facilitate the employment of unintelligent men—though this is too often a powerful subsidiary reason—but because the service demands the best in all respects. It is due the employés that they be given all practicable mechanical aids for the best performance of their work, and the use of such aids may also fairly be demanded by supervising officers to give them confidence and leave their minds free from unnecessary anxiety. There are plenty of reasons for abolishing plain white lights just as soon as an agreement can be reached in regard to a substitute for them.

We have no magic remedy to offer; we simply wish to set forth the principal elements of the question so that they shall not be overlooked by those whose duty it is to act in the matter.

1. "It goes without saying" that a signal should be as distinctive as possible. A "white" light is certainly the opposite of this whenever it is, or appears to the engineman to be, near another white light; and as this condition is very common, the assertion that the only normal night signal is one whose indication is given either by its shape or its color needs no argument for its support. The long use of white without accident is largely owing to the fact that lights are generally on high posts. Aside from the fact that some signals must be on comparatively short posts, the proposition to use colors exclusively is worthy of attention by reason of the possibility such use offers of making all high posts shorter, and so less expensive. Ordinary switch targets are, indeed, low; and many of them indicate all clear at night by an uncolored light; but it is familiar knowledge that hundreds of switches are passed every night by engineers who do not see them. Either by reason of a poor view or careless habits of the runners the switches are passed without being seen in season for the sight to be of any value; the claim that white is successful as a night switch signal is therefore lacking in force.

2. Green is considerably used for all-clear in ordinary switch lights. This makes its use as a cautionary signal in semaphores somewhat inconsistent, and strengthens the demand for a green all-clear signal in the latter, if general uniformity is to be sought.

3. The claim that green and red are the only available colors for night use is, to say the least, not proved. Purple glasses used for back lights are by most people instantly distinguished from either red or green. Purple is, indeed, less available for long distances than red or green, but it is quite possible that the necessity for making signals visible at a great distance is less important than it is generally held to be. The most perfect system of signals provides for running trains at full speed even during a dense fog; if safety and celerity can be secured with a short view a part of the time, why not all the time? It is not necessary to carry this argument to its full length to show the feasibility of other colors than red and green. The possibilities of blue as a night signal have never yet been satisfactorily tested. Officers who do not deem it necessary to weed out color-blind persons from their forces, or who realize the danger from that defect but have not the courage to examine their men, can find an objection to the use of green for safety and red for the opposite in the fact that these two colors both appear to the color blind as gray; but the detection of this fault in the vision is so simple and so certain, and has been so successfully carried out on so many roads, that we give this consideration no weight. If the freedom of all the engineers and other trainmen from color blindness is not to be ascertained as a certainty, all color signals should be abandoned.

4. The argument for the use of white because it is consistent with the all-clear day signal would fall to the ground if white were abandoned in the day time. Such abandonment is not by any means out of the question. The use of semaphores of a neutral color is one indication of the tendency away from traditional practice. White is the absence of color, and an important principle in signaling is that which requires the absence of an object that is ordinarily visible to be regarded as a danger signal. In fact, there is ground in this theory for completely reversing the present order, and treating white as an indication of danger or caution instead of safety. It is not necessary to follow this theory to its fullest extent, and it would be impossible in our present space to mention all the points bearing on the general question; but the subject deserves more consideration than it receives, and the one principle that was violated in the practice at Interlochen (the location of the derailment we have referred to), and which is violated in a thousand other places—the principle which requires every breakage or failure of apparatus or fixtures to indicate danger, is sufficiently important to justify such consideration.

European Passenger Rates.

A series of figures has been recently laid before the French House of Deputies, in connection with some proposed measures of reform, which enables us to extend to other countries the comparisons which we have made between England and America.

The nominal rates, forming the basis of regular, one-way tickets, are as follows:

	Cents per mile.			
	Class I.	Class II.	Class III.	Class IV.
France	4.0	3.0	2.2	...
England	4.1	3.1	2.	...
Belgium	3.1	2.4	1.6	...
Holland	3.4	2.7	1.7	...
Germany	3.2	2.4	1.6	0.8
Hungary	2.4	1.6	0.8	...
Switzerland	3.4	2.4	1.7	...
Italy	3.6	2.5	1.6	...
Spain	4.2	3.2	2.0	...
Russia	4.8	3.5	1.8	...

These figures taken by themselves are an unfair basis of comparison, because many of them are given only on the slowest trains, to passengers without baggage.

England gives express service and free baggage at the rates named in the table. France gives free baggage, but her express trains as a rule carry only first class passengers, and the very fast ones charge from 20 to 50 per cent. above first class rates—5 or 6 cents a mile in all. Belgium does not, or until recently did not, allow free baggage on local tickets. It carries second and often third class on express trains, at but slight additional charge. Holland and Switzerland are much like Belgium in these respects. North Germany allows free baggage, and has a great many third class express trains, at slight additional fare for each class; South Germany is less liberal in these respects. The Hungarian figures are minima, baggage and express service being charged at high additional rates. Italy allows no free baggage; express trains carry first and second class. In Spain and Russia the so-called express trains have only first and second class, often at advanced rates of fare; but a Spanish or Russian express is, by the American standard, a slow accommodation, while the ordinary passengers in those countries are conveyed at speeds which in America would be a disgrace to a self-respecting freight train.

On the other hand it should be said that, in many of the countries named, round trip, excursion, and commutation tickets are granted on very liberal terms. The result is that the actual receipts per passenger mile are very much lower than the schedule fares would indicate. They are given as follows:

	Cents per mile.
Belgium	1.16
Germany	1.31
Holland	1.65
Italy	1.75
France	1.78

The last named figure seems high, but it is to be remembered that French third class rates were decidedly raised in 1883. The Belgian figure, on the contrary, is extremely low, especially as compared with Holland. We give these last figures for what they are worth, without feeling sure of their accuracy.

How is it that some countries can give these low rates, while others cannot or at any rate do not? In other words, what are the conditions affecting relative passenger economy in different countries?

The first condition necessary for making cheap passenger traffic possible and profitable is density of population. If we compare the different parts of the

United States with one another we find that this is clearly the case; and the experience of Europe on the whole points in the same way. Not merely are there more people to travel where population is dense, but each person makes a great many more journeys. The ratio of passenger mileage to population is greatest where population is densest.

The second element affecting the profits of the passenger traffic is the number and speed of trains. If a given number of passengers is to be carried in a small number of cheap trains, we can have low rates combined with large train mile receipts and low proportionate expense. This is most markedly the case in British India, where the rates are about half a cent a mile, but where they have only one or two trains a day and get loads of three or four hundred in each of them—making the train mile receipts quite satisfactory. The opposite is seen in England and America, where the train service is large and good, the train loads relatively small, and the rates necessarily high.

Which direction passenger traffic development will take depends upon the character of the popular demand. If people demand improvement in the service, and are willing to pay what they must, we have good trains, comparatively small train loads and high rates. If they demand cheap rates, and are willing to take what service they can get at those rates, we have large loads and poor train service. That is the alternative. If time and comfort are more valuable to the traveler than a few cents difference in fare, he will pay a few cents more for time and comfort. If a laborer makes less than 10 cents an hour, he can afford to lose an hour to save 10 cents. If he makes more than 10 cents an hour, time is money to him.

This is the difference which many would-be reformers overlook. They assume that there are numbers of people anxious to travel but prevented by the existing scale of charges. This assumption is, to say the least, carried further than the facts will warrant. The offers of inferior accommodations at lower rates by some of our railroad companies have not met with any eager response. If an American manager should undertake to reduce at once the rates of fare and the frequency of trains to the continental standard in districts of equally dense population, we are confident that the change would provoke most violent opposition, and we believe that it would result in a diminution rather than an increase in the number of passengers carried.

America and England, and after them France, have paid high passenger rates; they have also had fast passenger service. It is no mere coincidence that America and England and France, in the order named, are the countries with high wages, or that Hungary and India, at the other end of the scale, are countries of low wages. In each case people wanted what they could afford, they were ready to pay for it and they got it.

The Kansas City Transportation Bureau, which was organized a year ago by the Commercial Club of that city, has just issued its first annual report, giving a synopsis of the doings of the body for the year. This was one of the earliest institutions of the kind. It was started and has been run on rational principles, and has made a creditable record. During the year the three other commercial bodies of the city have joined the Commercial Club in the support of this Bureau. The pamphlet contains the reports of George W. Fuller, chairman of the Committee of Management, and of A. J. Vanlandingham, the Commissioner, who is the active salaried officer. Mr. Vanlandingham was formerly a General Freight Agent and to his knowledge of railroad affairs, added to his other qualifications for an office of this kind, the success of the bureau is chiefly due. The chairman's report gives a history of the organization of the concern, and urges increased interest in it on the part of the business men of the city, the membership of the bureau still being smaller than it should be. A significant paragraph is that in which the chairman states that the general demoralization of freight rates during the past year partially neutralizes the benefits of the bureau, "large shippers getting favors on their own account." The bureau "has found it necessary to divert business from a road in only one instance; in that case the result was very satisfactory." The Commissioner's report gives the titles of 46 circulars which he has issued during the past year. These are mostly concerning changes in rates, though several of them evidently were the result of much labor and must have been of special value to Kansas City shippers. The usefulness of this feature alone ought to be sufficient justification, pecuniarily and otherwise, for the existence of the bureau, as the Commissioner has evidently done for the merchants of Kansas City a vast amount of work, consisting of studying and comparing tariffs, looking out for expected or threatened changes, etc., which, otherwise, each firm would have to do for itself. Among the more prominent achievements in which the bureau has been influential were the reduction of grain rates by the Kansas State Railroad Commissioners, and of rates on pig iron from the South. The Commissioner has attended numerous hearings and conferences, looking out for the interests of Kansas City, and has secured concessions from the railroads which otherwise must have been made the subject of an application to state railroad commissioners. He warns his constituents that a "strong pool or trust will probably be formed the coming year," and that Kansas City must be on the alert to protect her rights. He regards the National Transportation Bureau as a valuable organization, and has already reaped some benefit from it. Mr. Vanlandingham has in several cases declined to push demands which he was requested to make upon the railroads, recognizing the unreasonable or injudicious character of the claims. This may be regarded as a negative virtue, but it is by no means the least of the advantages to be got from such an office as this. On the whole, the railroads can only wish for the continued success of this and like organizations.

The Kansas railroad commissioners have grappled with the vexed problem of how to equitably divide freight cars when there are not enough of them to supply all applicants, but their report as published does not indicate any way of curing the evils so often experienced. This question is a tough one when in its simplest form, but when two or more roads are concerned the difficulties seem in many cases insurmountable. A coal dealer in Emporia complained that the miners at Columbus, on the Kansas City, Fort Scott & Gulf, could not get cars from that company, but the road replied that its own haul would be very short, that the Atchison, Topeka & Santa Fe would then take the coal (from Girard) and haul it much further, and that the latter road could not furnish its quota of cars for the joint traffic. To reload the coal was probably out of the question. Why complaint was not also entered against the Atchison road does not appear. The commissioners say that the initial road is bound to furnish cars, and that its obligation to do so is not lessened by the shortness of any haul; but they say nothing about the fact that the impractibility of reloading the coal entirely neutralizes this proposition, and simply add that joint business imposes an obligation on both roads. Here they stop, issuing no order to either road. Doubtless this position is taken because it is felt that any further action would be useless. A road of the size of the Atchison has difficulty in distributing cars with fairness when they are scarce, however impartial its intentions, and of course the views of traffic officers must often be far from impartial. In fact it is by no means certain that they may not in many cases justly favor one kind of traffic at the expense of another, for freight that pays the road a good profit and at the same time is essential to the prosperity of a large town or territory cannot reasonably be placed on a par with that which is carried at very low rates, and whose suppression or diversion would entail comparatively small loss or injustice. Very likely this argument does not apply specifically to the Kansas case, but it must be considered because it is sure to affect any controversy of this kind. The fact is, that treating the traffic as a whole, with due regard to all interests, as indeed it should always be treated, is a monstrous undertaking, and if railroad officers fail to properly perform the duty, something more than a commissioners' recommendation is needed as a remedy. A suit at law for damages, to be decided by a jury, would as likely result in injustice as otherwise, but it is the only line of procedure which is open to aggrieved shippers.

One of the noticeable features observed on a recent visit to the interlocking tower in the passenger yard of the Central of New Jersey at Jersey City * was the comparative quiet of the room. The constant movement of mechanical interlocking levers certainly furnishes enough noise, but at towers where operations are at all extensive one generally hears, in addition to the click of the lever latches, a variety of bells and telegraph sounders. Of course, the apparent confusion noticed by a visitor is not so much of a reality to the men working in the room, but the effect of the multitude of sounds is nevertheless wearing to their nerves, and all unnecessary racket should be eliminated. The arrangment of annunciators at Jersey City, devised by Mr. Robert Stewart, the Superintendent of Telegraph of the road, is based on the theory of employing visual instead of audible signals, as far as possible, and is so well worked out that we publish an account of it, with a diagram, in another column. Perhaps the best feature of the system is its utter simplicity; the arranging of indicators and circuit closers in such a manner that any employé of the station can understand and operate them with a moment's instruction. In introducing this apparatus Mr. Stewart has added several minor facilities which are worthy of imitation. A pneumatic tube between the conductors' room on the first floor and the train dispatchers' office on the second is one of these, and the conductors send up their reports by means of it. The desks at which the train dispatchers work are fixed upon a frame work so made that they can be easily changed from "standing-up" to "sitting-down" desks. The train sheet for the division controlled by the Jersey City dispatchers is very large and to facilitate work upon it the telegraph key used by the dispatcher is fixed to a portable base which he picks up and moves to any part of the desk as occasion may require. These and other conveniences, while not startlingly novel, serve when combined to make a difference in clerical and messenger work similar to that produced in mechanical work by the substitution of good oil for that which is poor.

* A diagram of this yard was published in the *Railroad Gazette* of June 28, 1889.

Considerable discussion has been aroused this week, and there is some speculation concerning a possible stumbling block in the next meeting of the Western presidents (which is appointed to be held in New York Jan. 8) in consequence of the refusal of the Union Pacific to allow the Chicago, Milwaukee & St. Paul and the Chicago, Rock Island & Pacific roads to run their passenger trains into Omaha, over the Union Pacific bridge. The St. Paul was to have run its trains into Omaha, beginning last Sunday, and the Rock Island was intending to run through Omaha to Denver, beginning Jan. 4. The St. Paul started its trains according to the contract Dec. 28, but the Union Pacific men put extra locks on the switches and stopped the trains. The arrangement for running these eastern trains into Omaha was in accordance with leases for 999 years made in May last, and the officers of the St. Paul road state that freight trains have been run since July 1 under the contracts. It appears that the Union Pacific refuses to carry out its agreement for the reason that the Rock Island intends to take advantage of its new route through Omaha, in connection with its line just completed between Omaha and Lincoln, to establish a line from Chicago to Denver and Ogden in opposition to the Union Pacific. This, of course, affords no excuse for excluding the St. Paul road from the bridge, and gives no legal warrant for violating a valid lease in any event; but from a statement made by Jay Gould, President of the Union Pacific, it appears that the company intends to justify its action by showing that under the charter of the Union Pacific the leases are *ultra vires*, and in violation of the contract relations existing between the road and the government. This, of course, necessitates the treatment of both companies alike. From Mr. Gould's statement it appears that the new members of the Union Pacific board of directors have just heard of the leases. It appears that this concession was granted by the Union Pacific after it became evident that the other two companies had resolved to build an independent bridge.

Several of the Georgia railroads have made a determined stand against the "county tax law." In 1889 the legislature of that state passed an act making railroad companies liable for taxation in each county through which their lines run, the tax to be based upon the total valuation of rolling stock and personal property, and each county to receive a portion of it, pro-rated according to the length of the road in that county. A petition for injunction has been filed, alleging that the act is illegal and void because it is repugnant to the constitutions of the United States and of the state of Georgia and offensive to other statutes regulating taxation in Georgia. The Georgia Southern & Florida, Macon & Birmingham, Georgia Midland & Gulf, Columbus Southern and Atlanta & Florida, all of which are assessed directly on their stock, and the Georgia and the Western & Atlantic, which are assessed on incomes, have refused to pay any of the taxes, and intend to contest the law in the courts. The East Tennessee, Virginia & Georgia paid its tax in four counties and then stopped. The Marietta & North Georgia has paid no tax on that portion of its road running through Cobb, Cherokee, Pickens and Gilmer counties. The Richmond & Danville, the Georgia Pacific and the Central, which have a greater mileage of road than the rest combined, have paid, or will pay, the tax in full. It appears that the county tax greatly exceeds the state tax, as heretofore assessed.

A printed pamphlet containing questions for use in examining men on train and telegraph rules is one of the valuable adjuncts issued by the Chesapeake & Ohio in connection with its new code of train rules, mentioned in last week's *Railroad Gazette*. No list of questions that we have thus far seen provides for all of the knotty points that are sure to come up in a thorough examination; in fact, we do not know how near perfection such a scheme could be carried, as the variety of questions necessary to properly impress ideas upon different minds is well nigh endless; and no catechism is regarded as satisfactory by its makers until it has been used for a time and revised and amplified in accordance with the experience gained from such use, but Mr. Stevens' is the best we have seen. It is got up in very handy shape, and is compactly arranged. The questions are brief and well put, and each one is followed by the number of the rule which shoud be referred to for the correct answer; as, for instance, "What is the flagman's last duty to perform before coming in? 99." "Do regular trains of any class lose their rights at any time? If so, when? 107." The green caution card used by block signal operators on this road, when admitting a second train to a section before the preceding one has cleared it, is 3 × 5½ in., with a *notched end*, similar to a caution semaphore.

The Supreme Court of Michigan has handed down a decision sustaining the graded railroad fare act. This law,

it will be remembered, provides that all Michigan roads whose gross passenger earnings are $3,000 per mile per annum shall charge passenger fares of not over 2 cents a mile; those whose earnings are between $2,000 and $3,000, 2½ cents, and all others 3 cents, special exceptions being made, however, for upper Peninsula roads. This law affects primarily the Chicago & Grand Trunk, which operates in the state without the special privileges of a state charter. Most of the other roads are affected, however, through competition. An appeal will doubtless be taken to the United States Supreme Court. The reports say that none of the roads have hitherto complied with the law. If it is enforced it will require the following rates: Main line of the Chicago & Grand Trunk, and the Toledo and Detroit Division of the Michigan Central, 2 cents per mile; Toledo and Detroit division of the Lake Shore & Michigan Southern, and Detroit and Port Huron division Chicago & Grand Trunk, 2½ cents. The main lines of the Michigan Central and Lake Shore & Michigan Southern are under special charter and not affected, but competition will compel them to make concessions in self-defense.

The South Carolina Legislature has passed a new railroad commission bill, copied closely after that existing in Georgia, and giving the Commission absolute power to fix rates. The bill provides for changing the status of the Commission, and it was intended to have tariffs prepared and published for all the roads of the state, but Governor Tillman has vetoed the bill. It is said that his reasons for refusing to approve the law were the provision for the election of commissioners by the Legislature, and that permitting an appeal to the courts from the decisions of the commissioners. The last objection sounds trivial and is hardly worth noticing; the first is said by the newspapers to be based on politics-personal considerations. The present Commission was to be abolished and a new one established, and the governor is said to be jealous because he was not given the power of appointing the members.

Draft Rigging—Western Railway Club.

At the December meeting of the club the subject of draft rigging was taken up in discussion of Mr. C. A. Schroyer's paper. The discussion is abstracted below:

MR. SCHROYER (C. & N. W.): Mr Waitt, of the Lake Shore, is here, and I would be pleased to have him tell us something about the cost of maintaining draft rigging on the Lake Shore road. Mr. John Kirby, of the Lake Shore, is one of the few men who realize the importance of increased strength of draft rigging. A few years ago his design was submitted to the Master Car Builders' Association for adoption as a standard, but was defeated by a large vote. Still, I would venture the assertion that in the draft rigging of the Lake Shore to-day, the cost of maintaining is as low, if not lower, than in any other draft rigging on the market.

MR. WAITT (L. S. & M. S.): I think, as Mr. Schroyer has said, that at least 50 per cent. of the breakages on cars are due to the giving out of the draft rigging. I have been connected with the Lake Shore for about 15 months, and I have never yet seen at our shops a single case of the draft rigging, as we have our standard now, being broken in any way, with the single exception of when the draft sills and the whole rigging was broken down in a wreck. Our draft rigging is in one sense a continuous one. It is continuous as to buffing strains, and I think that it is far more necessary than having it continuous in tensile strains. . . . We are able to carry any strain directly through to the further end of the car. The draft timbers (the side timbers which are bolted below the draft sills) are tied by a 1-in. or 1⅛-in. rod back through the cross-tie timbers, and then another rod goes back, tying the cross-tie timbers together, so that the strain is continuous both as to pulling and buffing. In order to get the necessary amount of resistance we have twin draft springs, side by side, used the same as our ordinary draft springs. I think they have something in the neighborhood of 10,000 lbs. capacity each, which would give 20,000 lbs. to the two springs.

I think the roads make a great mistake in perpetuating the spindle drawbar. How many of us have had breakages, resulting in a serious wreck, when it was found that the spindle had broken right across the keyway. Yet I can say that I never yet knew of a wreck caused by the breaking of the pocket which holds the springs or the rivets which hold the pocket to the drawbar.

MR. SCHROYER: Concerning the tail pin drawbar, at the Master Car Builders' convention I opposed the adoption of the 30-inch bar. . . . With the 30-inch bar many of the roads are using the tail pin, and they are losing the weight which was necessary to properly balance the bar on the hanger. In one case on our road the tail-pin bar pulled out as a result of the key shearing off, and wrecked many cars. It dropped down on the track and came in contact with the brake beams of the car. I have seen one or two similar accidents, and have thought very seriously of bringing the subject before the Master Car Builders' Association.

MR. RHODES (C., B. & Q.): I would like to call attention to a few points that Mr. Schroyer brings up in his paper. In the first place he says: "Probably 50 per cent. of the cost of maintaining our freight car equipment to-day, not including wheels or axles, is in the draft rigging." Further on, in speaking about the blows that the cars receive, he states: "These blows, as you know, are taken on a line from 4 to 6 in. below the sill line of the car, and in such a manner that the tendency is to break the sills downward over the bolsters or upward over the cross-centre ties, near the centre of the car. These conditions are almost universal in this country, and the question arises: Can we so improve the conditions as we now find them that the cost of maintenance may be decreased without adding greatly to the original cost of construction?" I want to call particular attention to this statement that these blows are taken on a line from 4 to 6 in. below the sill line of the car. Farther on Mr. Schroyer suggests a method of absorbing these blows. He says: "This capacity of the car itself to absorb blows depends largely on whether a continuous timber is used underneath the sill of the car, and whether the stops are so framed that a very rigid bearing is had on these timbers, and also upon the casting of a lug on the top of the bar which in its backward movement comes in contact with the end sill, with all of which conditions there is yet more or less destruction when the blow received is greater than the cushioning capacity of the springs used." Then Mr. Schroyer closes his paper by stating "that in all draft riggings constructed the power to absorb the blow received should be confined to some elastic construction in the draft rigging rather than to any portion of the construction which is intended to be rigid with the car body."

I am about prepared to endorse Mr. Schroyer's views throughout, with one exception, *i. e.*, I would like to consider a little more whether we cannot provide better than we are now doing for these buffing blows that the cars receive. I want first to call the attention of the meeting to the draft rigging on some of our tanks.

[Mr. Rhodes here illustrated on the blackboard two different forms of construction of draft rigging on tenders. No. 1 showed the centre line of the drawbar passing just below the end sill. No. 2 showed this line passing through the end sill.]

No. 1 will be recognized at once by master mechanics as a poorly designed draft attachment for tanks. You will observe that blows received on the centre line of the draft casting are all taken several inches below the line of the sills. Such a construction is a constant source of expense and renewing of the end sill. No. 2 represents the more common design of tank draft attachment, and it is of much stronger construction. The end sill is made narrow and deep, and re-enforced by a sub-sill attached securely to the main sill and continuous with it. There is no tearing down of the end sill in this case, and the blows received in service are largely absorbed in the sub-sill and main sill. Many lines are now introducing these continuous timbers under the centre sills of their cars.

A couple of years ago, in looking over the narrow gauge equipment of the D. & R. G., I noticed that all draft timbers were dispensed with and that the drawbar was run through the end sill and secured between the centre sills so that the buffing blows they received were all direct in line with the sills. . . . The superintendent of machinery said: "The cost to our draft rigging on our narrow gauge equipment is only about 15 per cent. of our total repairs." At this time the D. & R. G. were buying broad gauge equipment and yet the broad gauge cars were fitted with the draft rigging secured to the bottom of the sills as commonly practiced on broad gauge lines. The excuse for not following the successful results claimed for the narrow gauge was that such a construction would lower the floors of broad gauge cars from 6 to 7 in., which it was thought would be objectionable in transferring with other broad gauge cars and in loading and unloading at platforms designed for higher floors in general use.

On the C., B. & Q. we have lately taken this matter up and in recently designed cars we now run the drawbar through the end sill, securing it between the main sills of the car and doing away with all draft sills and their attachments. Forty-one pieces are dispensed with in each draft attachment, or 82 pieces per car. This construction brings the buffing blow in direct line with the sills and is giving very good results. The rigging is lasting even better than we expected. It almost looks as though 15 per cent. might be realized in the cost of repairs instead of the 50 per cent. claimed in the paper we are considering. There have been no complaints from what we most feared, viz., the lowering of the floors 6 to 7 in. Some of our agents have even said they preferred our low floored cars to those of the usual height. The tendency in track work is to raise the track, and, therefore, from that point of view, the fact that the cars are a little lower will give the track men more opportunity to keep the track in the shape that they want it. It seems to me, therefore, that if the reason for so much destruction to draft rigging is that the blows are taken in a line from 4 to 6 in. below the sill line of the car, it would be well to consider whether we cannot secure our draft rigging on a line with the sills, and then start to strengthen it from that point when necessary, rather than to commence with a rigging secured 4 to 6 in. below the sill line, which is acknowledged to be wrong at the start.

With this construction a spindle is necessary. And on that question of spindle and strap pocket I would say that the pulling strain on the pocket arrangement is, I believe, 150,000 lbs. before it will break. Now, the spindle attachment, if I recollect correctly, stands only about 110,000 lbs., perhaps 115,000 lbs.; but the drawbars that are being used won't stand much more than 100,000 lbs. Now, what is the use of putting a strength of 150,000 lbs. at the point of attachment if the drawbars themselves are going to give way at 100,000 lbs. or less?

MR. JOHANN: I wish to corroborate what Mr. Rhodes said. During my practice in the railroad service I had some cars constructed in the way he mentioned, in the year 1873, on a new road. I kept track of those cars, and some eight years afterward asked those in charge about them and was answered that to their knowledge none of those cars had broken down.

MR. SCHROYER: A very large percentage of our draft rigging is driven out, and the stop casting is driven back. Now, it doesn't make much difference how the casting is secured, if it is driven back. In the case where the draft timbers are used it will cost you $3 to $4 to replace them. Where it is secured to the centre sills of the car it will cost you $12 to $15 to replace them. That is one of the reasons why I have never favored the lowering of the sill of the car. There is no difference with Mr. Rhodes' method if the construction is such as to offer a continuous sill throughout the car, for it acts precisely as it would if the draft rigging was secured to the sills of the car.

PRESIDENT BARR (C., M. & St. P.): There seems to be some pretty strong argument in favor of attaching the draft rigging to the sills of the car. This, I suppose you all know, is a decided violation of one of the principles of design in machinery that is liable to be broken, and this principle is, that it should be so constructed that if it breaks it shall be where the breakage will make the least trouble.

MR. SCHROYER: Every draft rigging that is on the market to-day, except one, is too weak in its power to absorb the blow by some elastic movement in the rigging. I have made some experiments to determine what that cushioning capacity is, and I find that it is very low. Now, if we were to put up a rigging very strong in its parts, but which has no elastic movement in it to absorb these blows, we are going to destroy the car itself or property in the car as the result of that blow. The draft rigging should be capable of absorbing shocks in itself. Of course it is pretty hard to say what the limit of shocks received is, but it can be determined, and I want to say that the success of the Master Car Builders' type of drawbar depends very largely upon the ability of the draft rigging to absorb the blow by some elastic movement.

MR. FORSYTH (C., B. & Q.): I would like to discuss that part of the subject, viz., the proposition that the ideal draft rigging is that which should absorb all of the buffing blows, and that the resistance to buffing should not be in the rigid part of the car. Mr. Schroyer's practical application of that theory, as I understand it, is to use two buffing springs. I think it can easily be shown that the addition of the extra spring is entirely inadequate to meet the requirements which he states. His experiments were made with a car weighing 22,000 lbs., and he found that, with a standard spring of 18,000 lbs. capacity, its capacity was absorbed at three miles an hour, and that with a double spring, with the same empty car of the same capacity, it was absorbed at four miles an hour. Now, if we take a loaded car—for instance, a car weighing three times the weight of the empty car, or 66,000 lbs.—then we would require three times the number of springs which were in the drawbar to absorb all the shock, or six springs. If the velocity instead of being four miles an hour was six miles an hour, it would take double that, or twelve springs; so that I think this will show how large a weight of spring you would require in any draft rigging to absorb all buffing blows, and how little is gained by increasing by one spring. I think Mr. Westinghouse recognized this, in designing his friction buffer, when he gave it a capacity of 100,000 lbs., and found *that* was exhausted by conditions often met with in practice. I think that Mr. Schroyer's conclusion is an ideal that cannot be attained in our practical railroad working.

MR. SCHROYER: Mr. Forsyth misunderstands what I said in my paper. The arrangement of the springs was the best I could do with the inventive ability at my command. We got in two springs without changing the draft rigging at all.

MR. FORSYTH: The point I make is, that Mr. Schroyer having found how inadequate the springs are to absorb the blows, why should he want to confine all the resistance to buffing to the draft rigging?

MR. SCHROYER: I am not limiting you at all to the use of a spring.

MR. FORSYTH: You haven't anything else to offer, however.

PRESIDENT BARR: I would like to ask Mr. Rhodes how in lowering a car the way he describes he provides a proper transom.

MR. RHODES: We have a heavy iron transom which seems to meet the requirements very well; in fact, our cars with that low floor, stand up to their work a good deal better than the cars with the higher floors. In our old construction the bottom of all the sills rested on the top member of the transom. In the new design the top member comes on top of the centre and intermediate sills, and the bottom member on the bottom of these sills; in other words the centre and intermediate sills come between the two transom members, and the side sills rest on a step formed at the junction of the top and bottom members of the transom.

A Contribution to the Theory of Railroad Rates.

At the fourth annual meeting of the American Economic Association, at Washington, a paper was read by Prof. F. W. Taussig, of Harvard University, on the theory of railroad rates. The author devoted his attention more especially to the apparent anomalies in the varying charges for different classes of freight and passenger traffic. This explanation was found in the fact that the greater part of the cost of conducting railroad traffic is joint, and that railroad service belongs, in economic theory, with the class of commodities produced at joint cost, of which wool and mutton, gas and coke are the classic illustrations. This central fact, that the commodities are produced at joint cost, becomes apparent on a consideration, first, of the enormous plant of the railroads, and, second, of the very large proportion of operating expenses which is independent of the volume of the traffic.

The plant of a railroad—its roadbed, track, bridges, stations, terminal facilities—obviously serves one part of the traffic as well as another. The cost of furnishing the plant is joint cost. But interest on capital at the ordinary rate absorbs about one-half of the railroad's total receipts; in other words, one-half of the cost of supplying railroad service is clearly and wholly joint. As to the other half of a railroad's outgo, the operating expenses, we find maintenance of way, a large item, to be cost incurred for the whole traffic; the same is true of several office expenses, signaling and switching expenses, and a very large part of other items; so that there is no reason to doubt the justice of Sax's estimate that one-half of the total operating expenses is incurred for the traffic as a whole, and is independent of the volume of traffic. Fully three quarters of a railroad's total expenses (including both return to capital and operating expenses), therefore, represents joint cost. Indeed, this is a moderate statement of the extent to which the principle of joint cost is applicable.

Looking at those items of a railroad's expenses which seem not to be joint, such as the wages and supplies for freight transportation, we find that these expenses, while separate for freight service as distinct from passenger service, are yet to a large degree jointly incurred for the various classes within the freight service. It is a safe conclusion that the element of joint cost appears in almost every item of a railroad's outgo, and that the proportion of expenses which can be specifically assigned to any one consignment of freight or to any one batch of passengers is an insignificant fraction of the whole.

From this fact of preponderating joint cost it follows that railroad rates are permanently affected by demand, and that they cannot be based on any analysis of cost of service. Every item of railroad traffic, to be sure, must bring back to the railroad at least that portion of the expenses which has been separately incurred for it, just as wool cannot sell for less than the cost of shearing and handling it. But how much of the vastly preponderating joint cost will be got back from any one item of traffic depends upon the demand for this particular bit of transportation as compared with the demand for

other bits; just as the prices of wool and mutton are determined mainly by the relative demand for them. This is the fundamental explanation of classification of freight, of differential rates, of rates made with the purpose of building up traffic, of higher charges for longer hauls—in short, of the general practice of "charging what the traffic will bear." That practice is not an accident nor the result of arbitrary exercise of power by railroad managers; it is the simple consequence of the peculiar conditions of the industry. It will therefore appear under public as well as under private railroad management. Of this a striking illustration is found in the failure of the endeavor to introduce in Germany the so-called "natural" tariff, based on cost, which has been replaced by the present reform tariff, virtually a differential tariff, charging what the traffic will bear.

The paper criticised the speculations of Professor Cohn on the causes of discriminations in railroad rates, and denied that these discriminations were the result of ethical forces, or that they bore any analogy to taxation. It criticised also the statement that railroad rates are determined by "value of service." The conclusion was that railroad rates do not present, as many recent writers suppose, a case of value of quite an anomalous sort, inexplicable on the usual reasoning about cost and value, but merely an illustration on an enormous scale of the familiar principle of value applicable to all commodities produced at joint cost.

Mr. Gould and the Elevated Roads.

The *New York Tribune* recently published a letter, a column long, from Mr. Jay Gould, in reply to some editorial criticism by that journal on the service and management of the elevated roads. It was said, in the first place, that the train service of the elevated roads is inadequate and the speed slow, that there is no effort to satisfy public demands for convenience and comfort and that, in general, the company does not adequately use its present rights and franchises.

Mr. Gould says, in brief, that the train service to-day is relatively greater than it has ever been. The passengers carried in October and November were seven per cent. more than in the same months of 1889. The number of cars run and the car mileage were eight per cent. more. Moreover, 50 cars and a number of engines are now building and "we shall soon be able to run five-car trains continuously and add new trains as fast as the traffic demands it."

As for speed, the regular service is as fast as it has ever been, while the average speed is greater, owing to the increase in the number of fast trains. Express trains run 11 miles in 33 minutes—that is, at the rate of 20 miles an hour.

Up to Dec. 1, 1890, the elevated system had carried 1,425,835,807 passengers, only one of whom was killed in the cars. Fifty-one in all have lost their lives on the structures, but in no case without what the company considers contributory negligence. This, Mr. Gould says, is the marvel of the railroad world. He compares the comfort on the elevated trains with that on the street cars, of course greatly to the advantage of the former.

The second point made by the editor of the *Tribune* is that no additional facilities should be granted to the elevated roads, because they would not be used for the public good. This assumption Mr. Gould considers gratuitous, contrary to the record of the company, and untenable because opposed to its financial interests and to sound business principles. He summarizes the additional facilities required, viz., space for two platforms at the City Hall station, one for incoming and one for outgoing trains; and space for a loop at South Ferry, so that trains could turn around without changing engines. Property of no private individual would be taken, and Mr. Gould can see no conceivable objection on the part of the city or state. He says that the roads are now carrying an average of 600,000 people daily. With these slightly improved terminals they could carry two millions of people a day.

Mr. Gould points out that in the ten years immediately subsequent to the opening of the elevated roads the assessed valuation of real estate in the city increased by the sum of $411,770,472, and he claims that the elevated roads were the most potent cause of this increase. Moreover, they to-day pay taxes to the amount of nearly one-fortieth of all the taxes paid in the city, being, he claims, taxed at a higher rate than any other taxpayer in the state.

Trunk Line Argument Against Uniform Classification.

A semi-official statement of the attitude of the Trunk Lines toward the proposed uniform classification has been published, giving arguments substantially in line with those considered in these columns last week. We give the principal points of the article, which apparently summarizes an argument made before the Trunk Line Executive Committee:

There is no public demand for a uniform classification in any territory, large or small, and the chief advocates of the idea based their arguments upon the theory that the Interstate Commission had ordered one. This is not correct. While the Commission suggested the advisability of a uniform classification for all the railroads of the country, there are recent indications that the commissioners are not satisfied that the time has come for such an abrupt change. The existing classifications have grown out of the needs of the different territories in which they have been in force. They have been made by men who were acquainted with all the circumstances and who have tried to work in the mutual interest of shippers and railroads. Whenever a real necessity arises for extending the scope of any classification beyond its present territory it can be done without difficulty. The principle of uniformity should be extended gradually as the growth of the country makes it necessary. It is true that some roads in the western portion of the Central Traffic Association territory make through rates to and beyond the Missouri River in competition with other roads which use a different classification, and that for this business an amalgamation of classifications would be desirable; but the whole volume of this through business is too limited to be allowed to injuriously disturb rates on two-thirds the business of the country.

Even under the official classification there is need of many commodity tariffs and special rates to protect local interests. There are thousands of these and they cannot be abolished all at once without intolerable disturbance of the business interests of this section of the country. They are necessary evils, but their number would be multiplied if a uniform classification were adopted for the whole country. The practical result would be to make the uniform classification an exception instead of the rule—in other words, to provoke demoralization in rates, instead of helping the efforts to secure as stable and uniform tariffs as possible.

The plan divides the expenses of the necessary central board according to tonnage, but it gives only an equal representation to each of the 11 associations that would be included. In other words, while the territory covered by the present official classification carries three-fourths of the tonnage of the country and produces two-thirds of the freight revenue, the associations representing that territory would have in the central board only six votes out of 22. The plan gives absolute powers to the proposed chairmen and to the board, and against this the trunk lines protest. Even arbitration is debarred. It is proposed that a decision of two-thirds of the members of the board shall be final on all questions of classification. Under the present system the conclusions of the Official Classification Committee are in the nature of recommendations, and they are submitted to the vote of the several roads for confirmation. The committee, in the first place, is so constituted as to contain representatives from substantially all the different railroad interests in the Joint Committee territory. They are, therefore, well able to judge of the manner in which any proposed change would affect the particular interest which they represent; and in case of any error of judgment on their part, any member of the Joint Committee can state his objection to any proposed change, bring the question before the chairman and vice-chairman for arbitration, make argument and be heard; but under the proposed plan, no such opportunity is given; each district has but two members on the board, and it is impossible that they should be thoroughly acquainted with the effect of a proposed change upon all the interests they represent—while they would, in fact, be salaried officers of some particular railroad interest in the district they represent; yet their action is final, and any change, sanctioned by two-thirds of this board, is promulgated and takes effect without any opportunity for review, protest, argument or arbitration. It is also proposed that there shall be a Chairman of the Board located at Chicago, and three District Chairmen, at New York, Atlanta and St. Louis, respectively. These officers are not to be appointed by the roads: they are not to be appointed by the associations which they are to represent; they are to be elected by the Classification Board. . . . Each territory should appoint its own District Chairman, and each district or association or road should have a number of votes on these questions proportionate to the value of its traffic interest to be affected. The trunk lines have no through rate arrangements with roads using other classifications which necessitate uniformity throughout the country. . . .

TECHNICAL.

Iron and Steel.

A receiver has been appointed for the Birmingham Ala.) Rolling Mill Co., which has been compelled to suspend on account of the recent failure of the United States Rolling Stock Co.

The Tallapoosa (Ala.) Furnace Co. is preparing to make its present plant an iron furnace, and will erect another stockhouse, 11 × 60 ft., enlarge its cast house and put in additional machinery.

The Napier Iron Co., Henryville, Tenn., has contracted with Stein & Schwarz, of Philadelphia, for the erection of a 12 × 60 ft. blast furnace.

The North Carolina Steel & Iron Co., at a recent meeting of its directors at Greensboro, N. C., decided to commence the erection at once of a 120-ton iron furnace.

The Pancoast Ventilated Car.

The reader will remember that considerable discussion took place in the early part of last year as to the relative merits of ventilated and refrigerator cars for the transportation of fruits and other green produce. Mr. R. M. Pancoast, of Camden, N. J., as the result of a good deal of experience in handling fruit by rail, designed a car with a very perfect system of ventilation. This car was illustrated and quite fully described in the *Railroad Gazette* of April 11, 1890. Since that time a car has been fitted on his system for the Pennsylvania road, and another one for the Baltimore & Ohio. We have been told that the results have been favorable, but that these roads do not consider the test complete until the cars have passed the rounds of the season—that is, through spring, summer, and autumn service. Meanwhile very favorable reports have been received from shippers and consignees. The following letter was sent to Mr. Pancoast, unsolicited, by Mr. A. S. Watson, Manager of the Western New York Grape Growers' Shipping Association, Westfield, N. Y.:

"With regard to our experience with the new departure ventilation car, which I understand to be your patent, would say:

"It was placed at our disposal for loading with Chautauqua County Concord grapes at a time particularly well adapted to test its merits, owing to the continued and protracted rains, during the early part of the season, as well as the season of harvesting and preparing the same for market. It is a well-known fact, among all shippers of grapes through our section, that the fruit has been unusually predisposed to damage from mould while en route to market. Complaints from this source to all shippers this season have been numerous and constant. It was at the height of this most unfavorable time that we loaded this ventilator car. My impressions were very favorable from first inspection of the car; it being so constructed as to allow the air a free passage underneath and force it up through the fruit, while at the same time excluding all cinders and foreign matter. The results fully justified my faith in its adaptability for transporting fruit long distances. The car was shipped to Philadelphia and reported as arriving in fine order, free from mould, and sold for between two and three cents per basket more than other fruit from this locality, in refrigerator or any other cars, were selling for at that time, or at about sufficient advance to pay the whole freight.

"I wired promptly to get the car for continued use, but regret that the car was then sent south, and we were disappointed in not being favored with its further profitable use this season. We trust that in the future we may be able to obtain a supply of these cars, especially for our long distance shipments. They will certainly prove a great boon to the grape growers, and particularly to small fruit growers, and I should think for the transportation of all kinds of fruit.'

Canal Traction.

Experiments on the Oder-Spree Canal, in Germany, with reference to the most desirable means of propulsion to be used on the Dortmund-Ems canal, have shown that towing the vessels by locomotives running along the canal banks is preferable to cable traction.

St. Clair Tunnel.

The work of cleaning out the tunnel and laying the track is about completed. The ties are Georgia pine laid 4 in. apart. The stone abutments of the portals of the tunnel will be completed in ten days. The approaches to the mouth of the tunnel will be wide enough for six or eight tracks. The large stone used in the construction of the abutments is brought from Niagara Falls. The two steam shovels at work on the United States side will finish their work by Jan. 15. On the Canadian side the work is not quite as far advanced. The work of laying track in the new yards on each side is making good progress. There will be 20 miles of track in each yard.

The Servis Tie Plate.

We are told that the Servis tie plate is making more rapid progress than ever before. This is not only in the way of increased orders from roads already using it, but among roads which are now taking their first lots. It is said that several large orders for spring delivery have been given by some of the trunk lines and lines of moderate traffic using oak ties are putting in the plate on curves, heavy grades, in yards and other places where the wear is extraordinary. The Louisville Bridge Co.'s bridge over the Ohio River at Louisville has been supplied with the Servis plate within the last year, and it is stated that the company expects to save the first cost of the tie plate in one year in the labor heretofore required to keep the ties up to good surface.

The value of the tie plate in preventing spreading of rails is coming to be more generally recognized. The company has given us the following data of tests: At the Illinois Steel Works tests were made under the direction of Captain Hunt, with the results that a rail fastened to a thoroughly seasoned tie with two standard spikes required a pressure of 5,000 lbs. to spread the gauge ¼ in. With the tie plate the inside spike lifted when the rail was subjected to a pressure of 11,230 lbs. With the standard rail brace with three extra spikes the rail was moved with a pressure of 17,400 lbs. Tests were made at the Watertown Arsenal on cedar ties. A rail fastened with two spikes was moved on the application of 2,167 lbs. The Servis tie plate with two spikes showed a resistance of 7,910 lbs., while with a rail brace with three extra spikes a resistance of 9,200 lbs. was secured. These figures will indicate the probable value of the plate in preventing the canting of rails outward consequent upon the outer edge of the rail flange cutting into the tie, and also in preventing other disturbances of alignment, through shifting of the rails consequent upon creeping, etc.

Errors of Leveling.

"Errors of Leveling" was the subject of a paper read by Professor McLeod at the recent meeting of the Canadian Society of Civil Engineers at Montreal. The professor confined his remarks to such operations as are ordinarily included under the name of spirit-leveling, omitting any reference to trigonometrical leveling. He considered the different instruments employed in spirit leveling, with their methods of adjustment, and the results obtained, and insisted upon the importance of the following points: Stability of construction, delicacy of apparatus, and optical power. In classifying the errors he gave as their sources faulty instruments, unstable supports, incorrect observation, and personal and atmospheric conditions. The chief source of error arises, he said, from a permanent or temporary lack of parallelism between the line of sight and the bubble axis. An important source of error is also the change in length of the leveling rod due to variations of temperature. Each field party should be provided with the means of making a daily comparison of the rods used, with a standard length. Errors arising from unstable supports may occur through the instrument or the rod, and are usually of a cumulative character. The largest source of observational errors is believed to be due to the want of careful centering or reading the bubble. As to personal errors, each observer has his own peculiarities, which will largely affect a great length of line. This is in fact the personal equation of the observer.

Looking at the unavoidable errors of leveling in a more comprehensive manner, we regard them, he said in conclusion, as cumulative and accidental. The first classes should be so manipulated as to eliminate themselves during the progress of the work. The second should be removed by the same observer repeating the work under as nearly as possible the same conditions and in an opposite direction. Levels checked only in the same direction give fallacious results.

The City & Southwark Subway, London.

This railroad, the inauguration of which by the Prince of Wales was noted in our issue of Nov. 21, is said to be about to open for public traffic. Thursday, Dec. 18, was the day spoken of for this. The long delay is attributed to the ruling of the Board of Trade that a certain mileage should be first made on the line before the actual public working was commenced. We can only surmise that this order was made owing to some shortcomings on the part of the motive power, though nothing specific has transpired. If such be the case the wisdom of the course is undoubted, seeing that any failure when first started would have prejudiced the line in the opinion of the public far more even than the half ex-

plained delay has already done. As it is, however, should the motive power be reliable the novelty of the line will attract travel.

A Swedish Tube Tunnel Project.

A project has now been advanced by the Swedish engineer Lillyequist for connecting the cities Helsingborg and Elsenär on the Swedish and Danish coasts by a tube tunnel. In this instance, however, the tunnel tubes are to rest on piers consisting of metal caissons filled with beton. The tubes are to be made in about 100-foot sections and are to have an outer steel wall and an inner one of iron, the space between them to be filled with beton. The tunnel would thus practically be a series of submarine pipe girders each having a span of a little less than 100-feet. The total length of the tunnel would be about 2½ miles and its estimated cost from three to four million dollars.

The Jungfrau Railroads.

Relative to the two proposed systems for a railroad up the Jungfrau, the Swiss officials recently appointed a board of three experts to report upon the practicability of building and operating either one of the roads. The published report does not question the feasibility of either plan. From a sanitary standpoint, however, the commission does not consider it advisable to grant permission for the building of a road on either system before the projectors have demonstrated that it can be safely operated. Up to a height of only 9,840 ft. however, it is thought the construction and operation of such a road might be permitted with due regard to safety.

Fast Locomotives for the St. Gothard Railroad.

Three new locomotives, built by J. A. Maffei, of Munich, Germany, have recently been put in service on one one of the Swiss sections of the St. Gothard road, being chiefly remarkable for the fact that they are the first locomotives in Switzerland designed for a speed of 85 kilometres (about 53 miles) per hour.

They are tender engines and have two coupled axles. The cylinders and valve gear are outside. The engines are fitted for Westinghouse brake service and steam heating of the trains. In running order, ready for service, they weigh 118,000 lbs. Their length is a little over 34½ feet, diameter of driving wheels, 6.2 ft.; grate surface, 17.4 sq. ft., and heating surface, 11.50 sq. ft. The wheel base measures a little over 21 ft.

Injectors.

Mr. W. B. Mack, inventor of the well-known Mack injector, has recently effected an improvement on the instrument that will make this boiler feeder much more convenient in regions where the feed water is impregnated with lime and other incrusting impurities. It is well known that the solid ingredients present in feed water are to a great extent precipitated by heat, and the effect of this is that they are deposited on the inside of injectors forming a crust which soon destroys the efficiency of the instrument. The only remedy is to remove the interior tubes and clean them. The improvement designed by Mr. Mack consists of connecting the inner tubes by a plain cylindrical fit which is held together by means of a key. When this key is removed the tubes can be drawn apart either way without the least difficulty. The change will enable a man to examine the injector in a few minutes.

THE SCRAP HEAP.

Notes.

The Southern Pacific Co. has ordered all employés holding positions of trust to furnish bonds through the Pacific Surety Co., of San Francisco, which has for several years insured the employés of Wells, Fargo & Co.'s Express and of the Pacific Coast Steamship Co. The rate of premium is ¾ per cent.

The directors of the Chicago, Milwaukee & St. Paul have ratified the Western Presidents' agreement. President Roswell Miller and Director Samuel Spencer were appointed representatives of the road in the Advisory Board. This makes nine companies which have thus far subscribed to the agreement.

The new station of the New York, Lake Erie & Western at Port Jervis, N. Y., was destroyed by fire Dec. 25. Loss $30,000. The freight house of the Pittsburgh, Cincinnati, Chicago & St. Louis at Cincinnati, 125 × 600 ft, was burned Dec. 27, with a large quantity of freight. On the night of Dec. 28 the roundhouse of the Raleigh & Gaston, at Raleigh, N. C., was burnt and the 17 engines in it badly damaged.

A large number of blacksmiths in the Pullman Works at Pullman, Ill., left their work Dec. 27 in consequence of a reduction of wages announced for Jan. 1. The reduction affects 1,500 men who work by the piece. The strikers finally accepted the reduction, Manager Sessions stating that, owing to the financial stringency, railroad companies will order cars only at low prices and on long credit.

An order has been issued by the Lake Shore & Michigan Southern to members of the Order of Railway Telegraphers in the employ of the company, requesting them to withdraw from the order or to resign their positions. Last August Superintendent Kline sent a personal letter to every operator in the company's employ asking him to withdraw from the order, and also requesting those who would not do so to answer the letter and give the reason for not desiring to comply with the request. Many of them complied.

Foreign Notes.

A rack railroad from Göschenen to Andermatt is the latest in the already long list of those in operation and projected in Switzerland. Two companies have made applications for the franchise.

On Oct. 23 last, the output of Thomas steel at the Aachemer Steel Works, at Rothe Erde, near Aachen, Germany, reached the million-ton mark—the result of ten years' work. In commemoration of this event, the company made donations of $37,500 to the fund for the care of aged workingmen, and of $12,500 for the erection of school buildings.

Some interesting experiments have recently been made at Potsdam, Germany, with magnesium flash lights for signaling purposes at night. It was found, among other things, that even in a snow-laden atmosphere the light from three grammes of magnesium powder was visible at a distance of about 46 miles. With the addition of strontium or lithium a red light might be produced which, in thick weather, could be seen still further.

New York Central Train Wreckers Sentenced.

John J. Reed, who was indicted with Cain and Buett for misplacing the "cabbage switch" on the New York Central near Greenbush Sept. 4, during the strike, was sentenced at Troy Dec. 30 to seven years' imprisonment in Clinton prison. Thomas L. Cain and Arthur Buett, also under indictment for displacing the "cabbage switch," finally pleaded guilty. Buett was sentenced for two years and Cain for three years and eight months. On the trial, Reed claimed that the misplacing of the "cabbage switch" was a premeditated affair in which Pinkerton detectives took a leading part, giving details of conversations in which partial or complete confessions were extorted first from one man and then from another and finally worked against one another in such a way as to finally intimidate him (Reed) into confessing to acts that he did not commit. This was published, and apparently believed by many, but seems not to have influenced the jury.

The Railroad Strike in Scotland.

The strike of trainmen in Scotland continues, and seems to have invoived about 9,000 men. The cable dispatches are fragmentary and unsatisfactory, but it appears that up to the end of last week traffic was almost at a standstill. The merits of the dispute cannot be understood from the dispatches, but the engineers and signalmen seem to be the prime movers, and the demand for shorter hours the principal point of contention. The underlying cause of the strike is the improvement in general business throughout Great Britain which began in 1888. The latest accounts indicate that the companies are slowly restoring the passenger train service, as well as some freight trains, and that the strikes will probably fail on all the roads. It is said that some of the English roads have sent locomotive runners to work temporarily on Scotch roads. The officers of the Caledonian road have announced that so far as that road is concerned the strike is at an end. The Glasgow & Southwestern has reinstated many of its men.

A Shut Down of Iron Furnaces.

A meeting of furnace owners of the Mahoning and Shenango valleys, Ohio, was held at Youngstown, Dec. 30. The furnace owners have demanded a reduction of freight rates affecting them directly and of the price of coke. Neither of these demands having been conceded, it was unanimously decided to shut down 23 blast furnaces on Jan. 10, and not to resume operations until the railroads and coke makers make concessions. From 8,000 to 10,000 men will be thrown out of employment.

The Steel Works Club.

The first anniversary meeting of the Joliet (Ill.) Steel Works Club was held Dec. 20. The club was organized one year ago as an experiment to show what could be done in bringing about closer relations between employers and employés, as well as to afford a means of recreation, self-improvement and education to the working people in Joliet. To celebrate the success of the experiment, an entertainment was arranged to which many prominent citizens of Joliet and Chicago were invited. A special train of three Pullman coaches on the Rock Island took a large party, including 15 or 20 officials of the Illinois Steel Company, to Joliet. After inspecting the club house, Mr. S. Fewtrill, chairman of the club, stated that a years existence of the club had demonstrated that the interests of labor and capital were identical, and, speaking to the club members, said: "It is for you to show that we appreciate the gifts which have been bestowed upon us by taking advantage of the opportunities offered and becoming students of your work, not mere machines." Superintendent Crane said in his annual report that two points were settled; first, that the men wanted the club, and second that they would take care of it. The membership at present is 850, and there is nearly $1,100 in cash in the treasury, and in addition the club owns property to the value of $200.

Mr. W. R. Stirling, Vice-President of the Illinois Steel Company, and one of the prime movers in the formation of the club, expressed his satisfaction at the progress made, and said: "By the force of your example you can compel other employers of labor to give their employés equal facilities for improvement of social and mental condition." Mr. H. N. Higginbotham and Mr. N. W. Spencer also spoke on the relations between the company's officials and the club members. The addresses were interspersed with music by the club orchestra and some choice selections by the Philomela Ladies' Quartette of Chicago.

The New South Wales "Railway Institute."

The Railway Department, New South Wales, has founded and will put in operation at the beginning of this year a "Railway Institute." The building will cost about $20,000, and a library of 3,000 works has been provided at a cost of about $5,000. One feature of the Institute will be the circulation of the books among railroad men scattered through the colony.

Mileage of Express Companies.

The following shows the mileage operated by the different express companies Oct. 1, 1890, as announced by the joint traffic committee of the companies:

Adams	24,330
American	38,730
National	1,369
Northern Pacific	5,058
Pacific	21,042
Southern	21,740
United States	21,345
Wells, Fargo & Co. (railroad mileage)	22,801
Total	156,415

—Express Gazette.

The Pennsylvania Relief Department.

The voluntary relief department of the Pennsylvania lines west of Pittsburgh has submitted the regular monthly report for November. For the Pennsylvania company the report shows death benefits by accident $750, natural causes $2,250; disablement benefits on account of accident $2,027, by sickness $2,173; total, $7,200. For the Pittsburgh, Cincinnati, Chicago & St. Louis death benefits by accident were $250, for natural causes, $2,000; disablement benefits by accident, $2,842; for sickness, $3,038; total, $8,130. Total for the two divisions: Death benefits for accident, $1,000; for natural causes, $2,000. Disablement benefits for accident, $4,869; for sickness, $5,211. Grand total, $15,330. Number of benefits paid November, 1890, for death, 6; for accident, 323; for sickness, 419; total, 748. Total disbursements for 17 months to Nov. 30, 1890, death benefits, $110,000; disablement benefit, $125,513; total fund, $238,513.

Plans for the Illinois Central Station at Chicago.

A Chicago paper states that the Illinois Central has determined to build two passenger stations in Chicago, to take the place of the "ruins" now used, and that the plans have been prepared. One of the stations will be built to serve suburban traffic, and will be located on the lake front between Madison and Monroe streets; the second station will be on the lake shore at the foot of Sixteenth street, where the company already owns ample grounds for such a structure. The removal of all car shops and workshops to and the consolidation of the same at Burnside, south of Jackson Park, where the company owns 160 acres of the most desirable land for the purpose, is included in the plans. The whole scheme involves an expenditure of from $5,000,000 to $7,000,000, and a special bond issue will be made.

Canal Enlargement.

The contracts called for by the Canadian Government for the work of enlarging the Rapide Plat canal at Morrisburg, Ont., have been awarded as follows: Section 1, D. O'Brien & Son, Montreal; section 2, Weddell, McCuliff & Grass, Trenton, Ont.; section 3, H. W. J. & J. G. Poupore, of Ottawa. There were 57 tenders put in. The contracts were let to the lowest tenderers in each case. The aggregate amount of the three is slightly over $1,000,000.

Yard Men's Wages.

A conference of the general managers of the Western roads was held in Chicago last week relative to the demands of their switchmen for a uniform scale of wages. Switchmen in the Chicago yards have heretofore been paid by the hour, their wages in a day aggregating from 30 to 50 per cent. more than the day wages paid in small cities and towns. The managers agreed upon a scale approximating uniformity by which the wages of outside switchmen will be within $5 a month of the Chicago switchmen's wages. It is said that an agreement has been entered into by the managers and switchmen on the Rock Island, the Illinois Central, the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul roads. By its term Chicago wages are to be paid at all large centres, and $5 less at Council Bluffs, Sioux City, Des Moines, Duluth and St. Joseph. At Omaha, St. Paul, Milwaukee, Minneapolis, Peoria and Kansas City (first class) the pay will be $65 a month for day helpers and $70 for day foremen; $70 for night helpers, and $75 for night foremen, with a second-class schedule $5 less. The Rock Island also places Des Moines and Rock Island in the first class, and on the Northwestern Clinton is made first class.

Locomotive Building in Australia.

The Railway Commissioners are calling for tenders for the construction in South Australia of 92 locomotive engines, to be delivered during a period of five years from March next. The contract must be executed under the eight hours' system. In 1888 a contract was let to Messrs. Martin & Co., Gawler, for 52 engines to be delivered within seven years, but this order has been found insufficient to meet the growing traffic.—*Hereapath's.*

The Passenger Agent's Art.

The offices of the Canadian Pacific at 353 Broadway were alive with Chinamen last evening, invited there to examine a model of the new steamers that are about to be put on by that company between Hong Kong and Vancouver. Some 150 celestials, mainly Mott street merchants, dropped in during the course of the evening, and after they had inspected the model steamer were regaled with a choice assortment of wines and cigars. —*New York Herald.*

Derailments—Unexplained.

An apparently harmless toy engine in the window of the book store at 223 Summit street jumped the track last evening just as big engines are apt to do and plunged into a cotton snow bank. The alcohol lamp under the boiler fired the cotton, and in a moment the display of holiday goods in the window was all aflame. The goods were destroyed, and the plate glass windows were cracked by the heat. Loss, $300.—*Toledo Blade.*

LOCOMOTIVE BUILDING.

The locomotives built by the Baldwin Works in 1890 (partly estimated) were, 953 as follows:

One pair drivers	1
Two pairs "	240
Three " "	439
Four " "	273

The output of the Schenectady Locomotive Works for 1890 was as follows:

12-wheelers	5
Consolidation (2 compounds)	44
10-wheelers (3 compounds)	85
Moguls	25
8-wheelers	66
8-wheel switchers	104
4- " "	8
Total	337

BRIDGE BUILDING.

Council Bluffs, Ia.—An iron bridge, about 100 ft. long, will be erected here next year. The City Engineer is preparing plans.

Fargo, S. Dak.—The County Auditor has advertised for proposals for the erection of a bridge across the Maple River, in Highland township.

Fort Erie, Ont.—The Buffalo & Erie Bridge Co. has applied to the Parliament of Canada for an act of incorporation to construct a suspension bridge across the Niagara River, from Buffalo to Fort Erie, for foot and carriage and railroad traffic. The structure is to be 120 ft. clear above the water.

Gilmer County, W. Va.—The County Court of Gilmer County, at a meeting held last week, appointed a commission to locate and compute the probable cost of a steel highway bridge, 150 ft. long, over the channel of Leading Creek in that county.

Jackson County, W. Va.—The County Court of Jackson County has ordered a commission appointed for the purpose of locating four new highway bridges over several streams in that county. One to be erected at or near Silverton will be of steel and over a hundred feet long.

Milledgeville, Ga.—The county commissioners will receive bids for the construction of a bridge over Tom Creek until Jan. 8.

Niagara, Ont.—The Whirlpool Bridge Co. will apply to the next Dominion Parliament for a charter, empowering it to construct an iron or steel bridge across the Niagara River, at or near Thompson's Point, below the Whirlpool. The bridge is to be used only for the purposes of an electric or steam railroad.

Perth, Ont.—This town is issuing debentures to the extent of $4,000 for the construction of an iron swing bridge across the Tay canal.

Quebec.—The Quebec government has placed the sum of $100,000 in the estimates for the coming year for the construction of iron bridges in that province.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern, semi-annual, 1¼ per cent., payable Feb. 2.

Central of Georgia, semi-annual, 4 per cent., payable Dec. 23.

Chicago, Rock Island & Pacific, quarterly, $1 per share, payable Feb. 2.

Chicago, St. Paul, Minneapolis & Omaha, 2 per cent. on the preferred stock, payable Jan. 20.

Kansas Southern, semi-annual, 2 per cent., and extra, 1 per cent.

Lake Shore & Michigan Southern, semi-annual, 2½ per cent., and extra, 1¼ per cent., payable Feb. 2.

Michigan Central, semi-annual, 2 per cent., and extra, 1 per cent., payable Feb. 2.

New York Central & Hudson River, quarterly, 1 per cent., and special, ½ per cent., payable Jan. 15.

New York, New Haven & Hartford, quarterly, 2½ per cent.

Pennsylvania & Northwestern, semi-annual, 2½ per cent., payable Jan. 10.

Toledo & Ohio Central, quarterly, 1¼ per cent. on the preferred stock, payable Jan. 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, annual, Addison, N. Y., Jan. 12.

Albemarle & Pantego, annual, Norfolk, Va., Jan. 20.

Boston & Lowell, annual, Boston, Mass., Jan. 7.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 7.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 13.

Kings County (Elevated), annual, Brooklyn, N. Y., Jan. 14.

Lehigh Valley, annual, Philadelphia, Pa., Jan. 20.

Little Schuylkill, annual, 410 Walnut street, Philadelphia, Pa., Jan. 14.

Mine Hill & Schuylkill Haven, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 12.

Nesquehoning Valley, annual, 226 South Third street, Philadelphia, Pa., Jan. 12.

New York, Ontario & Western, annual, 18 Exchange place, New York City, Jan. 21.

North Pennsylvania, annual, Philadelphia, Pa., Jan. 14.

Norwich & Worcester, annual, Worcester, Mass., Jan. 14.

Ottawa Colonization, annual, Montreal, P. Que., Jan. 6.

Philadelphia & Reading, annual, Philadelphia, Pa., Jan. 12.

Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 12.

Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 27.

Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 27.

Pontiac Pacific Junction, annual, Montreal, P. Que., Jan. 14.

St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 13.

Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan. 5.

Terre Haute & Logansport, annual, Terre Haute, Ind., Jan. 5.

Toledo & Ohio Central Extension, annual, Marietta, O., Jan. 12,

Western & Atlantic, annual, Atlanta, Ga , Jan. 21.

Western New York & Pennsylvania, annual, 242 South Third street, Philadelphia, Pa., Jan. 12.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Southern & Southwestern Railway Club will hold its next meeting in Atlanta, Ga., Jan. 15.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on thefirst and third Wednesday in each month. at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m , on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday, of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holps regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p.m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* generally holds its meetings at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The *Civil Engineers, Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

Boston Society of Civil Engineers.

A regular meeting was held Dec. 17, 1890, at the American House, Boston, Vice-President Freeman in the chair, 51 members and 30 visitors present.

Messrs. Ellery C. Appleton, Alfred W. French, Eugene J. Spencer and Elton D. Walker were elected members of the society.

Mr. Howard A. Carson, Chief Engineer of the Metropolitan system of sewerage, gave an informal talk upon the work under his charge. With the aid of lantern views he explained the work which had already been done on the Brighton, East Boston and Winthorp sections. He also gave a description of the method of tunneling now being used under the Hudson River.

Mr. F. P. Stearns, who was one of the commissioners appointed to report a system of sewerage for the District of Columbia, was the next speaker. He explained that the problem as a double one: To keep the low district from being flooded by freshets, and to remove the sewerage to a place where it would not cause harm. One way to protect from freshets is by filling. Another is to dike the district and pump out the water, The Commission recommended the latter. High-level intercepting sewers, which would carry the water from the high districts as far as possible, and leave the low districts with as small a quantity of water as possible to be pumped, would be put in. About 940 acres would have to be taken care of by pumping. The proposed system was estimated for 500,000 people, and in size and as to population it is very nearly parallel to the North Metropolitan system.

At the meeting of Jan. 21, 1891, Mr. Laurence Bradford will describe a trip on the upper Missouri River, and the means taken for the improvement of its navigation.

Engineers' Club of Philadelphia.

A regular meeting was held Dec., 20, 1890, President H. W. Spangler in the chair; 21 members present.

Mr. Edward Hurst Brown presented a paper on "Suburban Development," in which he referred particularly to the development of suburban places of residence in the vicinity of Philadelphia. In discussion Mr. Henry G. Morris advanced the opinion that a large building, something after the order of the Drexel building in Philadelphia, could be most advantageously used as a place of residence by families; that a city could be constructed with such places on alternate squares, arranged after the manner of the black squares on a checker board, leaving the other spaces open for healthful breathing spaces and various purposes.

The Secretary presented, for Mr. John Graham, Jr., a paper upon the "Use of a Pumping Dredge by the Norfolk Co., at Norfolk, Va.," and explained its use in the reclamation of low waste land in such localities. He says that the advantages of this machine seem to be its ability to transport material to a reasonable distance, celerity in dredging and removing obstacles to navigation, celerity in filling, economy in removing and depositing the material.

The Secretary presented, for Mr. G. R. Henderson, a paper on "Crown Bar Stays," illustrated by two drawings of stays and giving the formulas by which they were proportioned in his practice, also the results of actual tests as to strength.

The Secretary presented, for Mr. Charles H. Haswell, a brief paper upon "Shingle for Concrete and Beton." He is of the opinion that shingle under certain conditions is superior to broken stone in the composition of concrete and beton, both in strength and in economy of cost.

Western Railway Club.

The subjects for the January meeting are discussion of the papers by Mr. David L. Barnes, of the *Railroad Gazette*, on Vertical Plane Couplers and Air Brakes, and of Mr. J. N. Barr, of the Chicago, Milwaukee & St. Paul, on Counterbalancing of Locomotives.

PERSONAL.

—Mr. S. A. Smart, heretofore Traveling Passenger Agent, has been appointed General Baggage Agent to succeed S. E. Dana, resigned.

—Mr. L. J. Seargeant, Sir Joseph Hickson's successor as General Manager of the Grand Trunk, is the present Traffic Manager. He is still in middle life and most of his railroad service has been on the Grand Trunk.

—Mr. H. B. Kellog, for many years Division Roadmaster of the Southern Pacific at Oakland, Cal., has resigned to accept a position with the New York Central & Hudson River road, with headquarters at Albany, N. Y.

—Mr. W. H. Bancroft, formerly General Superintendent of the Rio Grande Western, has been appointed General Superintendent of the Rocky Mountain Division of the Northern Pacific, with headquarters at Missoula, Mont.

—The President has appointed Mr. Joseph W. Paddock, of Nebraska, to be a Government Director of the Union Pacific Railroad, vice Mr. James W. Savage, deceased.

—Mr. James H. Stevenson, Secretary and Treasurer of the Delaware & Bound Brook Railroad, and of many of the New Jersey lines, died on Saturday of injuries received on the railroad at Lindley Station on Dec. 18. He was in his 84th year.

—Mr. W. J. McKee, formerly a Superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, and who afterward became Division Superintendent of the Central of Georgia, has been appointed Master of Transportation of the lattter company.

—Mr. J. S. Baker, for some time Secretary of the Adirondack road, died in New York City, Dec. 25. Mr. Baker was nearly twenty years Private Secretary and confidential clerk of the late T. C. Durant, of the Union Pacific. He afterwards became connected with the Mississippi & Missouri road.

—Dr. William Taylor, Secretary and Treasurer of the United Railways of New Jersey and of the various branches of the Pennsylvania in New Jersey, died at Cambridge, N. J., last week in his 65th year. He had been ill a number of weeks. Dr. Taylor had been almost continuously associated with railroad work for a half-century.

—Judge J. D. Springer, Assistant to President Allen Manvel, of the Atchison, Topeka & Santa Fe, has been appointed Third Vice-President of the road, an office which has been vacant since the resignation of Mr. James F. Goddard, now Commissioner of the Trunk Lines Association. Judge Springer was formerly General Counsel of the Minneapolis & St. Louis, and was appointed Assistant to the President of the Atchison soon after Mr. Manvel's election.

—Mr. John O. Ewan, Superintendent of the Second Division of the Louisville, New Albany & Chicago, has resigned, and Mr. J. B. Safford, Superintendent of the First Division, has been appointed his successor. Mr. Ewan was formerly Superintendent of the Indianapolis Division of the Cleveland, Cincinnati, Chicago & St. Louis, and when he resigned was appointed Superintendent of Transportation of the Louisville, New Albany & Chicago, and Superintendent last August, to succeed Mr. J. C. Loomis, resigned.

—Mr. S. B. Opdyke, Jr., who recently resigned as General Superintendent of the Central New England & Western, will associate himself with Mr. M. Benner at No. 226 South Fourth street, Philadelphia, in general contract work for iron and wooden buildings, bridges and general structural work. Mr. Benner was in charge of the drafting room and general details of the Keystone Bridge Co., Pittsburgh, for a number of years, and Mr. Opdyke was also associated with him and with the same company about two years, from 1877 to 1879. Mr. Benner has had charge of the details of some of the largest bridges built by the Keystone Bridge Co., such as the Ohio River bridges at Steubenville, Cincinnati, etc., and a large number of pivot bridges.

—The announcement made this week of the resignation of Sir Joseph Hickson, General Manager of the Grand Trunk, was a complete surprise to all except those most directly interested. Sir Joseph's career as a railroad officer is well known in this country and to railroad men generally. He began life as a clerk on one of the English railroads, and he has attained his present position solely by his ability and great force of character. He is now about 60 years old, and half of his life has been spent in the service of the Grand Trunk. He was appointed Chief-Accountant in 1862, and Secretary and Treasurer in 1874. He has been General Manager since the latter date. Sir Joseph is President of the Michigan Air Line and other Grand Trunk lines in the United States. It is understood that he will retain his connection with those lines and will also continue to act in an advisory capacity to the Grand Trunk.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—The following officers have been elected: Morton S. Parmelee, Malone, N. Y., President; Charles W. Breed, Vice-President; Melburn W. Hutchins, Secretary; Orris S. Lawrence, Treasurer, and McGlary & Paddock, Attorneys. The principal office is at Malone.

Alexandria, Tyler & Northwestern.—The following officers have been elected: Richard B. Hubbard, President, Tyler, Tex.; James P. Douglas, Vice-President, Tyler, and B. F. Wathen, Chief Engineer, Dallas, Tex. J. Heron Crosman, No. 64 Broadway, New York City, is Eastern Agent.

Atchison, Topeka & Santa Fe.—John G. Taylor, General Live Stock Agent of the St. Louis & San Francisco, has become General Live Stock Agent of the Atchison system, with office at Kansas City.

Brockville, Westport & Sault Ste. Marie.—At the annual meeting of the stockholders, held last week, the following directors were appointed: R. G. Hervey, W. H. Cole, G. H. Weatherhead, D. W. Downey, Robert Bowie, Chilion Jones, D. Derbyshire, H. T. Fitzsimmons, James Mooney, Brockville, Ont., W. G. Parish, Athens, Ont. The directors elected the following officers: R. G. Hervey, President; W. H. Cole, Vice-President; James Mooney, Treasurer, and E. A. Geiger, Secretary.

Buffalo, Thousand Islands & Portland.—The annual meeting of the shareholders of the road was held in New York Dec. 29. William Lummis and Edward M. Brown were elected to fill vacancies, otherwise the Board of Directors was re-elected. Charles Parsons was re-elected President and J. A. Lawyer Secretary and Treasurer.

Camden, Watertown & Northern.—The Board of Directors of this new road met at Watertown, N. Y., Dec. 27, and elected officers as follows: Austin Corbin, New York, President; B. B. Taggart, Watertown, Vice-President; James L. Newton, Watertown, Secretary; S. F. Bagg, Watertown, Treasurer. The Executive Committee is Austin Corbin of New York and B. B. Taggart, George D. Knowlton, A. D. Remington and H. F. Englehart of Watertown.

Chelsea Beach.—The stockholders of the road held their annual meeting last week at Boston, Mass. Frank Jones, S. C. Lawrence, A. P. Potter, C. A. Sinclair and James T. Furber were elected directors.

Chicago & Eastern Illinois.—The following changes are announced: A. A. Bowman, Acting Train Master appointed Train Master, with headquarters at Danville, Ill. C. J. Clifford, Acting General Master Menchanic, appointed General Master Mechanic, with headquarters at Danville. He will have charge of motive power and machinery department. T. W. Burrows having resigned as Superintendent of Transportation to engage in other business, M. S. Connors has been appointed Superintendent with headquarters at Danville.

Chicago, Milwaukee & St. Paul.—The following appointments have been made: G. F. White, Division Freight and Passenger Agent, Davenport, Ia.; B. H. O'Meara, Division Freight and Passenger Agent, Cedar Rapids, Ia.; J. T. Conley, Division Freight and Passenger Agent, Winona, Minn.; W. E. Peak, Division Freight and Passenger Agent, Mason City, Ia.

Chicago & Western Indiana.—W. B. McPhail has been appointed Master Mechanic of the road. He was

formerly Master Mechanic of the Fort Wayne, Cincinnati & Louisville.

Chicago & West Michigan.—F. V. Davis has been appointed General Freight Agent, taking effect Jan. 1. He will have charge of all matters pertaining to the freight traffic. His office will be at Grand Rapids, Mich.

Cincinnati, New Orleans & Texas Pacific.—The directors met in Cincinnati last Saturday, and formally ratified the new organization. The resignation of John H. Inman was accepted, and S. M. Felton, Jr., was elected to fill the vacancy. Mr. Felton was then elected President of the company, Henry Fink First and C. C. Harvey Second Vice-President; Richard Carroll, General Manager; S. Miller, Traffic Manager; George B. Nicholson, Chief Engineer; H. H. Tatem, Secretary and Treasurer; R. X. Ryan, General Freight Agent; D. G. Edwards, General Passenger Agent, and James Meehan, Superintendent of Motive Power.

Cleveland, Cincinnati, Chicago & St. Louis.—F. P. Boatman, Master of Rolling Stock of the Ohio & Mississippi, has been appointed Superintendent of Motive Power of the road, with office at Indianapolis.

Coos Bay, Roseburg & Eastern Railroad & Navigation Co.—T. R. Sheridan, Roseburg, Ore., is the President of this road; F. W. Burnett, San Francisco, Cal., Vice-President; W. E. Baines, Marshfield, Ore., Secretary and Treasurer, and R. A. Graham, Marshfield, General Manager.

Frankford & Holmesburg.—At a meeting held in the general offices of the Pennsylvania, in Philadelphia, Dec. 28, the purchasers at the recent foreclosure sale elected the following officers: J. N. Du Barry, President; Albert Hewson, Secretary; Taber Ashton, Treasurer. A board of directors was also chosen, comprising William H. Barnes, John P. Green, N. Parker Shortridge and William A. Patton.

Kansas City, Fort Smith & Southern.—W. H. Bush has been appointed Assistant General Manager, and P. D. Peters Auditor, with headquarters at Neosho, Mo.

Lake Shore & Michigan Southern.—The auditor announces that the title of R. H. Hill, Chief Clerk of Freight Accounts, will hereafter be Auditor of Freight Receipts, and that the title of F. A. Wyman, Chief Clerk of Passenger Accounts, will be Auditor of Passengers Receipts.

Louisville, St. Louis & Texas.—J. C. Loomis, formerly Superintendent of the Second Division of the Louisville, New Albany & Chicago, and also Superintendent of the Louisville & Nashville, has been made General Superintendent of this road, with headquarters at Louisville.

Mobile, Jackson & Kansas City.—At the stockholders' recent meeting, in Mobile, the following directors were elected: James Herdman, C. T. Hills, both of Michigan; R. W. Millsops, F. A. Luling, J. W. Whiting, Mobile; John L. Rapier, A. S. Benn, James K. Glennon, R. Dane, H. Austill, of Mobile.

Montgomery, Tuscaloosa & Memphis.—At a meeting of the directors of this railroad in Montgomery, Ala., recently directors were elected as follows: James H. Newcombe and W. H. Vanvoorhees, of New York, to fill the vacancies caused by the death of M. E. Pratt and W. S. Chilsholm. The board also selected W. T. Northington a director to succeed J. W. Woolfolk, who has resigned the presidency of the company. The officers of the company are now: Chester C. Monroe, of New York, President; Isaac B. Newcombe, of New York, First Vice-President; E. B. Joseph, Montgomery, Second Vice-President.

Norfolk & Western.—O. Howard Roger, Traveling Freight Agent, is appointed Assistant General Freight Agent, with headquarters at Roanoke.

Philadelphia & Reading Lines.—The stockholders of the Mount Carbon & Port Carbon, Schuylkill Valley Navigation and Mill Creek & Minehill Navigation & Railroad companies held meetings in Philadelphia Dec. 29, and elected the following officers: A. A. McLeod, President; P. C. Hollis, Secretary and Treasurer; A. J. Antelo, George de B. Keim, Thomas Cochran, P. C. Hollis, William R. Taylor and James M. Landis, Board of Managers.

Port Townsend Southern.—J. C. Phelps, formerly with the Union Pacific, has been appointed Assistant Superintent of the Olympia & Chehalis Valley road, now a part of the Port Townsend Southern, succeeding H. F. Nichols. His office will be at Olympia, Wash.

Rome, Watertown & Ogdensburg.—At the annual meeting in New York, Dec. 29, the old board of directors was re-elected as follows, with the exception that Cyrus J. Lawrence succeeds the late John S. Farlow; Edwin Parsons, Charles Parsons, George Parsons, Charles Parsons, Jr., Clarence S. Day, William M. White, William Lummis, Walton Ferguson, John Thorn, John F. Maynard, John M. Cruse, J. Q. A. Johnson and Cyrus J. Lawrence. The directors elected Charles Parsons President, Charles Parsons, Jr., and Clarence S. Day Vice-Presidents, and J. A. Lawyer Secretary and Treasurer.

Seattle, Boise City & Salt Lake.—The officers of this newly-chartered road are: J. E. Fulton, President; A. B. Moss, Vice-President; J. W. Bates, General Manager; Joseph Pinkham, Treasurer; and M. L. Sproat, Secretary. The office is at Boise City, Idaho.

Southern Pacific.—Warren Palmer, C. E., for many years connected with the company, in the engineering department, has been appointed Division Roadmaster at Oakland, Cal., vice, N. B. Kellog, resigned.

Toledo, Ann Arbor & North Michigan.—John J. Kirby local freight agent at Toledo, has been made Assistant General Passenger Agent of the road.

Union Pacific.—E. L. Lomax, General Passenger Agent for the Missouri division, has been appointed General Passenger and Ticket Agent of the entire system. This abolishes the office of General Passenger Agent at Portland, Denver, St. Joseph, Ogden, Salt Lake, Fort Worth and Kansas City.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—The incorporation of this company in New York was noted recently. The company has been organized to construct a road from the Canada international line via Malone through the Adirondack Mountains to Schenectady, about 200 miles. This project is affiliated with the St. Lawrence & Adirondack road, which is to extend from the Canada border through the province of Quebec to the St. Lawrence River at Valleyfield, where a connection will be made with the Canada Atlantic, near its new steel bridge across the river. The line when completed will form a new independent route to Montreal and Ottawa, from Central New York. An agreement has been signed for the construction of the section from Malone to Valleyfield, and it is said that work will be begun in the early spring. From Malone south the survey will be made as directly as possible to Schenectady, passing near to "Owl's Head," Ore Bed, Paul Smith's, the Saranac and Long Lake in the eastern part of the Adirondacks. The line is through a hitherto undeveloped section of the Adirondacks and touches many of the most frequented summer resorts.

Alexandria, Tyler & Northwestern.—The officers of the road state that the contracts for grading most of the projected road, probably that between Tyler and Gainesville, Tex., will be awarded next April or May. It is understood that the funds advanced to the projectors, together with the amounts raised by subscription from the various towns on the route, are sufficient to grade the entire road from the Sabine River to the Red River. The projectors expect to secure additional financial aid from Europe, and they state that the construction of the road will not be commenced until enough money has been raised to complete it which is a very commendable intention. The route over which the company is chartered to build is from a point in Sabine County, on the Sabine River, a navigable stream, northwest through Hemphill, Tyler, Kaufman, Terrell, McKinney, Denton and Gainesville, passing through counties many of which have but little railroad mileage. Two branches are proposed, one from Kaufman County west to Dallas City, and the other south from Sabine County to Orange, near Sabine Pass. The projected road is 350 miles long. The grades will be easy and few iron bridges will be necessary, the longest being over the lower Neches and Upper Sabine Rivers. A director of the company states that the road when completed will reach immense tracts of long leaf and short leaf (hard) pine, little of which has been cut. Other sections pass through well cultivated grain and cotton land, and in eastern Texas through the iron district, ore from which assays from 35 to 45 and 55 per cent. of metallic iron.

Bayard, Petersburgh & Moorefield.—The company has three corps of engineers working south from Gormania, W. Va., locating the line from that point to Moorefield, 25 miles southeast of Bayard. It is expected to begin construction work in the spring.

Briarfield, Blocton & Birmingham.—The East Tennessee, Virginia & Georgia will not run into Birmingham by Jan. 1, as expected, the big cut on Jeckyle & George's contract, near Brock's, nine miles from Bessemer, having again caved in. This is a 65-ft. cut at Geueris Gap, Shades Mountain, and has given a great deal of trouble to the engineers on the division. The cut was so deep that it was at first decided to tunnel the gap, but the character of the soil was so loose that it was found impossible to do so without incurring great expense. A cut was then made, which caved in several times. The engineers said that further damage had been guarded against, but rains again caused a landslide of about 1,000 cu. yds. of earth into the cut, which it will be difficult to excavate.

Cape Girardeau & Southwestern.—The stockholders at a meeting held in Cape Girardeau, Mo., Dec. 20, voted to increase the capital stock $850,000 and to extend the road from Hunter to the Arkansas state line.

Chambersburg & Gettysburg.—C. F. Stouffer, of Lancaster, Pa., is the contractor for building this road from Conocoheague to Calledonia, Pa., about six miles. When that line has been completed an extension six miles long from the latter point to Wolf Hill will be begun. This road was formerly called the Mont Alto.

Chelsea Beach.—The annual meeting was held in Boston, Dec. 26, and the stockholders voted to authorize the directors to increase the capital stock, but not to an amount exceeding $91,000. This action was deemed necessary to defray construction expenses.

Chicago & Western Indiana.—A meeting of the stockholders has been called to be held in Chicago, Feb. 24, to take action on the number of proposed improvements. It is intended to put in additional switches and side tracks and to double-track the road to the mills, shipping yards and blast furnaces that are steadily increasing in number in the vicinity of the Calumet River. The expense of making these improvements is to be met by issuing additional bonds to the amount of $1,000,000, to be secured by the mortgage of Dec. 1, 1882. A meeting of the stockholders of the Belt Railway of Chicago will also be held on the same date for the purpose of making a new lease with the Chicago & Western Indiana, by which the latter will have the use of additional property and facilities.

Coos Bay, Roseburg & Eastern.—About 10 miles of this road has been graded from Marshfield, on Coos Bay, near the Pacific Ocean, south toward Utter City. The contractor has about 400 men clearing the right of way and grading southeast through Coos County, Ore., to Myrtle Point. The rails for the first 35 miles are en route from Philadelphia by vessel, and it is expected that they will arrive at Coos Bay in February, when tracklaying will be commenced. The contract has been let to R. A. Graham, of Marshfield, Ore., for the 97 miles of that road from Myrtle Point. The road will extend from the latter town east and northwest to Roseburg. The road is being built with 66 ft. grades and maximum curves of eight degrees. There will be one drawbridge and several Howe trusses, the longest of which will be across the Umpqua River, at Roseburg, 600 ft.

Danville & East Tennessee.—T. W. M. Draper, Chief Engineer of the road, which is projected from Danville, Va., to Bristol, Tenn., has three surveying parties in the field surveying the route from Danville west up the Dan River towards Madison and over the Blue Ridge Mountains to Bristol. The officers state that grading will commence at both ends of the line at a very early day. The road is being laid out with maximum grades of 60 ft. and curves not exceeding 12 degrees. For half a mile at Danville the road will be built in the bed of the river.

Duluth, South Shore & Atlantic.—Henry & Balch, of Minneapolis, have the contract for a branch of the St. Ignace & Sault Ste. Marie Division, from the station near Bay Mills, Mich., to that town, a distance of about two miles.

Escanaba, Iron Mountain & Western.—This road has been completed from Escanaba, Mich., to Iron Mountain, a distance of about 53 miles. McIntosh Bros., of Milwaukee, who had the contract for the main line, will also build the branches from Iron Mountain to Florence, Wis., 14 miles, and to Crystal Falls, 12 miles.

Fairhaven & Southern.—McCoy & O'Brien, the contractors on the New Westminster Southern division, have the construction forces employed in ballasting, and no more track will be laid until the two unfinished bridges are built. The distance between the ends of the track is only six miles, but there are two long bridges, one over Campbell Creek and the other over Nickomel River. It is expected to have the track laid this week.

Findlay Belt.—It is proposed to begin grading this week. Hosea Paul, of Indianapolis, has just completed a survey beginning at the Witherald rolling mills, northeast of Findlay, O., on the Lake Erie & Western, across the city to the Cincinnati, Hamilton & Dayton. It is expected to build the road to a connection with the New York, Chicago & St. Louis, at Stuartsville.

Flint & Pere Marquette.—The company has had a considerable force engaged for a large part of the year making various changes and permanent improvements. Many of the sidings on the main line have been extended, and several logging spurs constructed. Two 18-pocket Susemihl coal chutes have been built, one at Clare, and one at Manistee Junction, Mich.; also a new store house at East Saginaw, and small passenger stations at Lake, Easy, Croswell and Marlette. Changes have been made in the station grounds at Port Huron, and 400 lin. ft. of permanent dock constructed on the St. Clair River at that point. Three iron girder bridges—one 72 ft. through span across the Tobacco River at Clare, one 66 ft. through span over the Hersey River near Hersey, and one 40 ft. deck plate girder across Salt River on the Mt. Pleasant branch, have been erected.

Fort Worth & Rio Grande.—Work has commenced on the construction of an extension of the road from the point where it now intersects the Texas & Pacific, about one and a half miles west of the Fort Worth Union depot, into the city. The road has, ever since its construction, been using the Texas & Pacific track, the building of the line over certain lands in the city having been enjoined by the property owners. This matter has been settled and the line will soon have its own track running into the union station.

Georgia Midland & Gulf.—It is understood that the Georgia Midland & Gulf has concluded a contract with the Columbus Southern, by which its officers will extend their authority over the latter road after Jan. 1. The preliminary agreement has been signed and the directors of the two roads will meet and confirm the traffic contract in a few days. The arrangement is largely to secure more economical management, as the owners of the two lines are nearly identical.

Houston Central, Arkansas & Northern.—The company has filed for record in various counties of Arkansas a mortgage to George J. Gould, as trustee, to secure bonds to be issued on the road from Marianna, Ark., southwest through the counties of Lee, Phillips, Monroe, Arkansas, Desha, Chicot, Drew and Ashley into Louisiana.

Huntington & Big Sandy.—The grading on the road has been completed and ties are down all the way from Huntington to Kenova, W. Va. Tracklaying has been interfered with by the non-arrival of the rails. The substructure of the bridge across Fourpole River is all done.

Kansas City, Fort Smith & Southern.—The extension of the road to Sulphur Springs, Ark., is completed. Next year the road will be extended to Fort Smith.

Lehigh Valley.—It is expected that the South Plainfield & Roselle road and the Newark & Roselle road will be sufficiently completed by Jan. 1 to begin traffic. These two roads are portions of the New York extension, and for the present the company's passenger trains will leave its main track at South Plainfield and go to Newark via Roselle, and on to Jersey City over the Pennsylvania tracks. Passenger trains are now run by way of Metuchen.

Louisville & Nashville.—The grading for the Cumberland Valley branch extension from Cumberland Gap to Norton, Va., is all about completed and 25 miles of track has been laid from the Cumberland Gap end, which is being fully ballasted with limestone ballast. The viaducts and bridges will be all of iron; no wooden structure will be used. Tracklaying will proceded as rapidly as the erection of the iron trestles and bridges will permit, the material for which can only be transported to the different sites by the new track.

Mexican Central Construction Co.—The company expects to soon resume construction work in Mexico, and arrangements with that end in view are now being consummated. Probably the first work to be undertaken will be the partly finished Colima branch, as it is believed that its construction will result in a great increase of traffic to the Mexican National, with which it connects at Guadalajara. Colima is on the Pacific Ocean, and many improvements have been made at the harbor. The line will be about 140 miles long. Among other extensions upon which work may soon be commenced is one from Ojo Caliente, on the Zacatecas Division, west to Moctezuma, in the state of San Luis Potosi, on the main line of the road, about 60 miles, and also a line between Salvatierra, Zamora, La Barca and Guadalajara, passing north and south of Lake Chapala.

Mexican Roads.—About 16 miles of track has been laid from San Luis Potosi on the road being built from Matamoros to San Luis Potosi under the concession granted to Gen. Cuellar, and the grading is progressing rapidly.

Mexican Southern.—The Cantarranas bridge of this road, near Atixco, Mex., will be completed in January. It will be 650 ft. long and will have seven stone piers capped with iron. The Puebla & Matamoros branch will probably be completed to Tecomavaca by March next.

Missouri, Kansas & Texas.—The work on the Dallas & Waco extension is progressing rapidly, and the grade will be finished to Hillsboro this week. Tracklaying is progressing at the rate of a mile a day and is now completed to Milford, 20 miles, and is expected to be finished to Hillsboro in a few days.

New Roads.—An application will be made to the Canadian Parliament for an act to incorporate a company to construct a road from a point on the Canadian Pacific between Dog Lake and Sudbury, Ont., by way of the valleys of Moose River and its tributaries to a point on James' Bay.

The city of Austin, Tex., has let a contract for the masonry and grading on a standard gauge road from the Austin & Northwestern Railroad station in Austin

to the site of the dam over the Colorado River, about four miles. The contracts were let on the following approximates: 40,000 cu. yds. of earth work, 40,000 cu. yds. of rock excavation, 1,200 cu. yds. of rubble masonry, laid in cement mortar. J. P. Prizell is the engineer.

The preliminary surveys for a new road from Reading to Friedensburg, Pa., are about being completed. The distance is 10¼ miles, and the road will run through the Oley valley, and a level section of country. The cost of building the line will be about $70,000. The new road would connect with the Reading at Klapperthal Station.

Articles of incorporation will probably be filed in a short time in Washington for a road to run from South Bend to Colfax. The route will be from South Bend to Chehalis; up the Cowlitz River to its source, to North Yakima, and across the Columbia at Priest Rapids to Colfax.

Niagara Falls & Lewiston.—Ground will probably be broken on this road, near Lewiston, N. Y., this week. It is chartered to extend along the lower bank of the river from Niagara Falls to Lewiston. The road will connect with the New York Central at Lewiston and with the steamers for Toronto. The contracts are not yet awarded nor the cross-sectioning completed. The Niagara Falls & Whirlpool will be merged with this line.

Norfolk & Western.—The company has commenced tracklaying from Wayne Court House toward Ironton, O., on its Elkhorn extension. The road will be delayed by the tunnel at Wayne Court House for some time yet, but trains will be put on the part that is completed as soon as possible.

Northern Pacific.—The Northern Pacific & Montana branch, which leaves the main line of the Northern Pacific at De Smet, Mont., and has been under operation as far as Rivulet, a point 42 miles west, has been extended to St. Regis, Mont., 74 miles distant from De Smet, and at the Idaho state line. The entire extension is now being operated. The new stations opened are Quartz, Iron Mountain, Spring Gulch and St. Regis. The line from St. Regis to Mullan, Id., 11 miles, built under another charter, is also completed.

Parry Sound.—Work has been discontinued until March next on this road which connects the Northern division of the Grand Trunk with Parry Sound, Ont. The rails have been laid for 3½ miles, and 18 miles has been graded.

Pennsylvania.—The most important new construction work which this company has been engaged in during the past year has been the Trenton cut-off road, from Downington to Morrisville, N. J., upon which the grading is well advanced. The tracklaying will begin in a few days. Besides this line many short extensions of the various divisions have been built, and altogether 31 miles of new mileage has been added to the system since Jan. 1, 1890. This new road has been added to the following branches: Downington & Lancaster, extension from New Holland to a connection with the Pennsylvania, near Lancaster, Pa., 9.81 miles; Brown's Mills Branch, from New Lisbon to Brown's-Mills-in-the-Pines, N. J., 1.78 miles; extensions of the Tyrone & Clearfield: Ednie Branch, from Ednie Junction to terminus, 0.34 miles; Kendrick Branch, from Kendrick Junction to terminus, 0.70 miles; Banion Branch, extension from Banion Junction to terminus, 2.19 miles; West Pennsylvania Division, Winfield Branch, from a junction with Butler extension to terminus, 8.33 miles; Southwestern Pennsylvania, Radabaugh Branch, from junction Radabaugh Branch to terminus, 7.7 miles. The company has decided to construct a system of branch lines to aid in the development of the coal fields of the northern section of Cambria County, Pa. Work is to be commenced in the spring on new branches which will connect Hastings, La Jose, and Carroltown, striking the main line of the Pennsylvania road near Cresson.

Philadelphia, Harrisburgh & Pittsburgh.—The bridge across the Susquehanna River will be finished in a few days. It is expected that in six weeks the grading of the roadbed to Bowmansdale, Pa., will be completed. This work has been very slow on account of numerous heavy cuts. The track will then be laid as rapidly as possible. The distance from Harrisburgh to Bowmansdale is nine miles.

Ravenswood, Spencer & Glenville.—President William Woodward, of this road, last week sold the first $50,000 of the issue of $300,000 offered at Parkersburg and Wheeling, W. Va. The total issue is $400,000, and the bonds are indorsed by the Ohio River Railroad. The new road is being built very rapidly, the grading being almost completed from Ravenswood to Spencer, W. Va., and the ties are laid for a good part of the distance.

San Antonio & Aransas Pass.—The Receiver denies the report that the Waco extension would be pushed to completion. There are 50 miles uncompleted which would cost between $500,000 and $600,000. The Receivers are engaged in liquidating the floating indebtedness and interest on its bonds. The road is in no condition to spend $500,000. There is no immediate prospect of the completion of the Waco extension.

Seattle & Montana.—Work on this road is progressing rapidly, but some delays have been caused by the wet weather. The grade is nearly finished from Marysville, Wash., northward to a connection with the Fairhaven & Southern, 10 miles north of Mount Vernon, and early this year this section, 40 miles, will be ready for tracklaying. The rails will probably be laid from the northern terminus south to Seattle, the material being transported over the New Westminster Southern from British Columbia.

Southern Pacific.—The reconstruction of the branch line between Marysville and Knights Landing in Northern California is nearly completed, and will be put in operation in a month. Eighty car-loads of gravel are being deposited daily upon the road from a pit about eight miles south of Tehama, and a large force of men is at work. The track for a large part of the distance is on an embankment very strongly built to withstand floods. Cobbles are hauled from the Feather River, near Oroville, and used as walls in the embankment, which, it is expected, will prevent any washing of the track from the water of the stream. It is nearly a year since the roadbed was destroyed by the floods.

Tacoma & Northwestern.—The preliminary survey which has been in progress for the last four months from Tacoma has been completed to Haddock, Wash., the proposed northern terminus. The distance is 56 miles. The party of engineers, in charge of Ogden & Bosworth, began the survey last August at Gig Harbor, across the narrows from Tacoma, and ran the line down through Pierce and Kitsap counties to Port Orchard, to Hoods Canal, striking it at a point below Seabeck and opposite the Toando peninsula of Jefferson County. The line passes Port Orchard, the site of a proposed navy yard, and within four miles of Port Gamble. The line was located almost due north to the head of Port Townsend Bay. Frank C. Ross, of Tacoma, is President.

Utah Central.—Work is progressing on the eastern branch, from Park City, Utah, at the rate of from a half mile to a mile of track per day, and is now some six or seven miles from Park City toward Provo River, which will be reached in a few days, and it is hoped to reach Moon's Mill, 25 miles east of Park City, in early spring. The grade is for a standard gauge track, and it will only be a question of time when the entire system will be changed from narrow gauge. A survey will be made in the spring for a new location on that part of the line from Salt Lake City and Park City, between the Barclay and Gorgorza stations. The survey will cross the cañon to the south side and by a loop return to Barclay, but higher up the hill. The summit will be tunneled, and from there the grade will follow the wagon road to Gorgorza. This route will give a 4 per cent. grade instead of a 6 per cent. as at present.

Waco, Lampasas & Llano.—Work on the road is making good progress. A large force of men and teams is working between Lampasas and the Colorado River, a distance of 20 miles, and the force is being increased as rapidly as possible. Material for the bridge across the Colorado has been ordered.

West Virginia & Pittsburgh.—The extension of the Buckhannon River Branch is graded to Three Forks of Buckhannon River, a distance of 25 miles southeast of Buckhannon, W. Va. The track is already laid about 20 miles, and the work is being pushed as rapidly as possible. This branch of the road penetrates a well-timbered section of country, having a rich, fertile soil, and also rich coal fields. The Braxton division follows the West Fork River from Weston south through a settled portion of Lewis County to the headquarters of Oil Creek; thence to Burnsville, Braxton County, where it crosses Little Kanawha River, 16 miles above Glenville. From Burnsville the route follows Salt Lick Creek to the headwaters of Grannies Creek, thence down that stream to Elk River at Braxton C. H., a distance of 44 miles. The track is completed to Burnsville, a distance of 25 miles. This branch passes through an agricultural district. Numerous mills are sawing lumber for shipment on the completion of the road. A branch will be continued to Williams' River at a point near the mouth of Cherry River in Nicholas County, where the railroad company owns over 125,000 acres of forest land, underlaid with coal. The entire line of road, when completed, will comprise about 170 miles. It is bonded for $4,000,000, $1,000,000 of which remains in the treasurer's hands. The work of widening the old narrow gauge lines, and of grading and completing the two extensions, is being done by the West Virginia Improvement Co., of which J. A. Fickinger, of Weston, is Chief Engineer.

Whitefield & Jefferson.—The directors held a meeting at Concord, N. H., last week and approved the proposed 30-mile extension of the road from Jefferson Meadows to Pontook Falls, N. H.

Wilmington & Weldon.—Proposals are invited for the graduation and trestle work of the road from Fayetteville, N. C., to Rowland, 42 miles. The work will be divided into nine sections of about equal lengths. The trestle work will be mainly of driven pile work. Bids for trestle work may be made distinct from or in connection with the graduation. Plans and profiles and specifications can be seen at the office of the railroad in Wilmington or at Fayetteville. Bids will be opened Jan. 20. The work is to be completed before Aug. 1. Fleming Gardner, of Wilmington, N. C., is Engineer of Construction.

Winona & Southwestern.—The tracklaying to Spring Valley, 46 miles beyond Utica, was completed Dec. 23, and passenger trains are now running between Winona and Spring Valley, 81 miles. The end of track will remain at this point during the winter, but considerable ballasting will be done on the line built this year. Tracklaying will be resumed in March or April, and will soon reach Osage, Ia., 37 miles beyond, as most of the grading to that point has been finished. Many of the bridges have also been erected.

GENERAL RAILROAD NEWS.

Astoria & South Coast.—This road, extending from Smith's Point below Astoria to Clatsop Beach, Or., a distance of 17 miles, has just been purchased by D. P. Thompson, of Portland, Or. The price paid was $50,000. The road was placed in operation last summer.

Choctaw Coal & Railway.—This company, which was organized in Philadelphia about two years ago for the purpose of developing coal lands in the Indian Territory and building a railroad, has applied for a Receiver. The Treasurer states that the company has been obliged to resort to a receivership to protect its creditors. It has constructed within the past 15 months and is now operating a road 65 miles long, from a junction with the Missouri, Kansas & Texas at South McAlester to Western Junction, where it connects with the St. Louis & San Francisco road. It holds valuable coal leases in the Choctaw Indian country, which it has developed to a present output of about 600 tons daily. Its work thus far has been largely done on money borrowed on pledge of bonds, secured by mortgage of the railroad and coal leases. Negotiations for the sale of these bonds were interrupted by the financial stringency during the autumn. A receivership is now resorted to as a protection in the Indian Territory and to hold the property together until the bonds can be permanently placed with the investors and the property be restored to the company's control.

Findlay, Fort Wayne & Western.—The company has recorded a mortgage with the recorder at Fort Wayne, Ind., for $1,440,000 in favor of the Washington Trust Co., of New York City, and Judge Allen Zollars, of Fort Wayne, as trustees. The principal is payable July 1, 1940, and the rate of interest is 5 per cent. The proceeds will be used in building the western extension of the road.

Hereford.—This company has executed a mortgage deed in favor of Frank Jones, William Farwell and William B. Ives, trustees for the bondholders of the railroad, and it has been deposited in the office of the Secretary of State of Canada.

Rome, Watertown & Ogdensburg.—The annual report gives the following figures of earnings for the last year: Gross earnings, $3,904,966; operating expenses, $2,250,103; net earnings, $1,654,852; income from other sources, $36,172; total income, $1,691,025; fixed charges, taxes and rentals, $1,049,618; net income, $641,406; dividends, 6 per cent., $359,502; surplus after paying dividends, $281,904. The increase in gross earnings is $517,663, or 15 per cent., and in net earnings $244,314, or 17 per cent. The surplus was reduced by charging to profit and loss $37,500, the cost of funding $1,300,000 of bonds due Jan. 1, 1891, into new 30-year 4 per cent. bonds and $70,000 paid for ballasting 100 miles of road, leaving an actual surplus of $174,404. The earnings for the six months ending Dec. 31, 1890, partly estimated, are $2,066,025 as against $2,040,257 for the same period last year. The expenses are $1,124,291 and $1,088,927 respectively and the net earnings, 1889, $951,329; 1890, $941,733. The lease in perpetuity of the Buffalo, Thousand Islands & Portland, which is to build a road from Suspension Bridge to Buffalo, N. Y., 25 miles, was approved. A stockholder asked what action would be taken if the New York Central built its proposed parallel line to the St. Lawrence, but was answered that the directors did not believe that the line would be constructed.

Rutland.—The lease of this road to the Central Vermont expires Dec. 31, and several months ago a new lease was effected with the Delaware & Hudson Canal Co., by which the road was to be operated by that company. That lease has been recently abrogated and a new one made with the Central Vermont, which is said to be more advantageous than the one about to expire, though in most respects very similar to the old one.

Union Pacific.—The October statement (preliminary) shows gross earnings, $3,993,124; increase, $270,613; net earnings, $1,170,332; decrease, $164,240. For eleven months to Nov. 30 gross earnings were $39,852,907, an increase of $3,756,116; net earnings, $13,189,626; decrease, $947,836.

Western & Atlantic.—At midnight Dec. 27 formal transfer was made of this road from the lease company which has operated it for 20 years to the Nashville, Chattanooga & St. Louis, the new lease company. Formal papers of transfer were signed during the day, Senator Brown, as President of the old lease company, turning it over to Governor Northen, he then transferring it to President Thomas, of the Nashville, Chattanooga & St. Louis.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 31, 1890.

There is very little of note happening here this week. No new moves are likely to be made, pending the meeting of the Presidents for the consideration of the details of the new organization, which is to be held in New York Jan. 8. The holding of this meeting in New York is viewed with considerable apprehension by many of the Western presidents, who fear that it will provoke hostile legislation among the granger legislatures, many of which will be in session next month. It is also thought by some to be ill-advised on account of the effect upon the Alton, but this fear is probably unfounded, as the Alton will or will not join the new Association irrespective of where or how the preliminary steps are taken; its connection being conditional upon the details of the plan being satisfactory.

The absorption of switching charges in Chicago has for some time been a thorn in the side to the Western roads, but no way has yet been found to reduce this expense. Another conference is on foot for the purpose of evolving some plan if possible which will reduce the expense of this service.

The mileage ticket question in dispute between Chairman Finley and the Atchison has been referred to Messrs. Oscar G. Murray, of the Big Four, and W. B. Shattuc, of the Ohio & Mississippi, for arbitration on the questions, (a) Is an appeal from the Chairman to the Association a bar to arbitration? and (b) does the bulletining of a ticket bar the redemption penalty? These arbitrators have selected Mr. H. W. Fuller, of the Chesapeake & Ohio, to act with them.

The Central Traffic Association has ordered that the following rule shall be printed in all their freight tariffs and shown on all bills of lading, in order to prevent any trouble in collecting charges for demurrage: "When freight is to be loaded by consignor, or unloaded by consignee, $1 per car per day, or fraction thereof, for delay beyond 48 hours in loading or unloading will be added to and constitute a part of the rates named in this tariff."

The Chicago & Alton announces that as soon as holiday tickets are off sale it will reduce the passenger rate from St. Louis to Chicago at least $1, and perhaps more. It says the Jacksonville Southeastern is cutting the rate to that amount through brokers over the recently formed Chicago-St. Louis line of the Atchison.

Chirman Blanchard announces that the advance of corn rates to all points took effect on Dec. 29, except that the St. Louis lines will be unable to advance their rates to points west of Buffalo, Pittsburgh, etc., until Jan. 10.

Considerable talk has been started here in consequence of the receipt by Western general passenger agents of floods of letters from ticket agents of the Pennsylvania road, saying they were in the field for commissions and asking what was now being paid to railroad men. Hitherto the Pennsylvania has discharged any of its agents found accepting commissions, and this indication of a relaxation is believed to be due to the aggressive action of the B. & O.

Traffic Notes.

The East Tennessee, Virginia & Georgia has adopted a rule that freight agents must receive explosives for transportation only on Monday of each week.

The Richmond & Danville is to put on a vestibuled train between Washington and Atlanta, to run through in 18 hours. The extra fare is $4.

The Chicago, St. Paul & Kansas City has closed its freight and ticket offices in Boston and Buffalo, and has curtailed the forces in New York and Philadelphia.

Chicago Eastbound Shipments.

Eastbound shipments from Chicago for the week ending Dec. 27 amounted to 71,900 tons, against 80,797 the previous week and 102,191 the corresponding week of last year. The flour, grain and provision traffic amounted to 41,501 tons, of which the Grand Trunk took 22 per cent., Lake Shore 18, Michigan Central and Nickel Plate each 16, Ft. Wayne 14, Baltimore & Ohio 11, and Pan Handle 4.